



9th International Lymphoedema Framework Conference

Co-hosted by the American
Lymphedema Framework Project



13 - 15 June 2019
Chicago · USA



New insights on:

- **Lipedema**
- **Night-time compression**

JOBST Symposium

Room Acapulco: Friday, 14th June, 12:15 - 13:15

Focusing on two major topics of compression therapy, the JOBST Symposium presents:

A) Lipedema – a necessary paradigm shift

Tobias Bertsch, Földi Clinic, Specialist Clinic for Lymphology, European Center for Lymphology, Black Forest, Germany

B) Looking at night-time compression from three angles: doctor, therapist and patient - based on experiences from a US therapist and a German prospective observation study on JOBST Relax

Tobias Bertsch, Földi Clinic, Specialist Clinic for Lymphology, European Center for Lymphology, Black Forest, Germany
Linda S. Roherty, PT, CLT-LANA, Oncology and Lymphedema Rehab Specialist, Advocate Sherman Hospital, Elgin, IL, USA

Lunch boxes plus a JOBST space snack will be served in front of the symposium room (Acapulco).

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Welcome

Dear Colleagues & Participants,

It is an honour and pleasure to welcome you to the 9th International Lymphoedema Framework Conference in downtown Chicago, USA. This is the first time the conference is being held in the United States.

We are proud to have this conference co-hosted by the American Lymphedema Framework Project (ALFP). The ALFP was the first country framework to be established and join the International Lymphoedema Framework (ILF) umbrella of national frameworks in 2008. Their support of the international lymphedema community through systematic reviews, helped produce the ILF Best Practice Position Documents: Compression Therapy and Surgical Interventions.

Today, the ILF network includes 14 different frameworks around the world. Almost all of them will be represented here at the conference.

The 2019 conference scientific committee and faculty includes an impressive roster of opinion experts in the field across a wide range of disciplines including lymphology, genetics, pathology, oncology, dermatology, surgery, imaging, psychology, wound care and more.

This 2019 International Lymphoedema Conference brings together clinicians, researchers, industry providers, healthcare providers, advocacy groups and patients, with the goal of sharing knowledge and furthering lymphology for the benefit of all those affected by lymphedema and related disorders. The meeting is multidisciplinary and patient focused: with an emphasis on improving lymphedema outcomes through innovation and collaboration.

Welcome to Chicago!

Best regards,

On behalf of the ILF and ALFP Organising and Scientific Committees

Faculty

Jane Armer, RN, PhD

University of Missouri, Columbia, USA

Marcia Beck, MsN

University of Missouri, Columbia, USA

Michael Bernas, PhD

TCU & UNTHSC School of Medicine,
Texas, USA

Tobias Bertsch, MD, PhD

Foeldi Clinic, Germany

Joseph Feldman, MD

NorthShore University HealthSystem,
Chicago, USA

Kathleen Francis, MD

RWJ Barnabas Health, New Jersey, USA

Mei Fu, RN, PhD

New York University, New York, USA

Heather Ferguson

South Carolina, USA

Kristiana Gordon, MD, CLT

St George's Hospital, London, United
Kingdom

Jay Granzow, MD, PhD

UCLA School of Medicine, California

Sophia Hanson

Author, Brooklyn, USA

Keith Harding, MD, PhD

Cardiff University, Wales

Gavin Hughes, PhD

Cardiff University, Wales

Tonny Karlsmark, MD

Bispebjerg Hospital, Copenhagen,
Denmark

Guenther Klose, MLD/CDT

Klose Training, Denver, Colorado, USA

Bonnie Lasinski, MA, PT

Boris-Lasinski School, South Carolina,
USA

Christine Moffatt, RN, PhD

Nottingham Trent University & Notting-
ham University, United Kingdom

Judith Nudelman, MD, RN

Brown University, Rhode Island, USA

Susan Norregaard, RN

Bispebjerg University Hospital,
Copenhagen, Denmark

Guillermo Oliver, PhD

Northwestern University, Illinois, USA

Neil Piller, PhD

Flinders University, South Australia,
Australia

Isabelle Quèrè, MD, PhD

University Hospital of Montpellier, France

Stan Rockson, MD, PhD

Stanford University, California

Julia Rodrick, OTR, CLT-LANA

Springfield Clinic Rehabilitation
Services, Illinois, USA

Stephanie Ross, PhD

Northwestern University Feinberg
School of Medicine, USA

Paula Stewart, MD, CLT-LANA

Rehab Hospital at Trustpoint Hospital,
Tennessee, USA

Nicole Stout, DPT, CLT-LANA

National Institutes of Health, Maryland,
USA

Alphonse Taghain, MD, PhD

Massachusetts General Hospital,
Boston, USA

Melanie Thomas, PhD

ABM University Health Board, Wales

Objectives

2019 International Lymphoedema Conference

Improving Lymphedema Outcomes through Innovation and Collaboration

LEARNING OBJECTIVES

At the end of the conference delegates will be able to:

- Describe the general anatomy, physiology, pathology, and anomalies of the lymphatic system
- Describe at least three of the latest basic and clinical research findings in the field of lymphology
- Describe at least 2 recent advances in lymphedema diagnostics and imaging
- Recognize different opinions impacting risk reduction practices and balance evidence based vs. clinical experience
- Identify the impact that obesity plays in lymphedema and lipedema: both from a scientific and clinical perspective
- Recognize the challenges of compression and how to adapt for clinical practice
- Describe at least 3 surgical approaches to the treatment of lymphedema
- Describe 3 elements unique to treatment of children with lymphedema
- Recognize the impact to quality of life that lymphedema patients experience
- Identify recent innovative and promising approaches to lymphedema management
- Describe the role of genetics and related structural and functional issues in the lymphatic system
- Describe how international and USA lymphedema projects and studies can impact change through international collaboration

ACCREDITATION STATEMENT

This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the University of Chicago Pritzker School of Medicine and International Lymphoedema Framework. The University of Chicago is accredited by the ACCME to provide continuing medical education for physicians.

CREDIT DESIGNATION STATEMENT

The University of Chicago Pritzker School of Medicine designates this live activity for a maximum of *23 AMA PRA Category I Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

ORGANISING COMMITTEE

Tonny Karlsmark
Copenhagen, Denmark – ILF

Anna Kennedy
Toronto, CA – ILF

Bonnie Lasinski
Pawleys Island, South Carolina ALFP

Julia Rodrick
Springfield, Illinois – ALFP

Kathryn Thrift
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ABOUT THE ILF

ILF was established as a UK charity in 2009. The framework developed from a project aiming at bringing together the main stakeholders involved in the management of lymphoedema in the United Kingdom in 2002, but ILF rapidly spread to become an international project with an objective to support individual countries develop a long-term strategy for lymphoedema management.

The success of the UK Lymphoedema Framework in improving the management of this condition in Great Britain has led many international Lymphoedema experts to express an interest in the Framework Methodology and Spirit. This is why Christine Moffatt CBE and her team decided to set up the International Lymphoedema Framework (ILF) as a charity.

The choice of charitable status is a strong message to the lymphoedema community on the ethos and vision that govern the Framework. It is also a guarantee of the independence of the ILF in the ethical use of its resources and its capacity to actively contribute to the improvement of the management of lymphoedema worldwide and especially in developing countries.

For more information about the ILF, please visit www.lympho.org

ABOUT THE ALFP

The American Lymphedema Framework Project (ALFP) is a national multidisciplinary collaborative initiative developed under the leadership of Professor Jane Armer, PhD, RN, Director, and Dr. Joseph Feldman, MD, CLT-LANA, Co-Director, along with Professor Christine Moffatt, PhD, RN, Clinical Director of the International Lymphoedema Framework (established in the United Kingdom), Dr. Janice Cormier, ALFP Executive Committee member, and nationally recognized clinical experts and investigators in the field of lymphedema. Headquarters for the ALFP are located at the University of Missouri Center for Lymphedema Research, Practice, and Health Policy.

The mission of the ALFP is to improve the management of lymphedema and related disorders in the United States while contributing to global international advancement. This will be achieved by defining best practices of lymphedema management and developing a minimum data set to improve lymphedema outcomes. The ALFP will establish a leadership role in lymphedema risk reduction, treatment, education, health policy, and research. These outcomes will be achieved through a partnership among all lymphedema stakeholders, including patients, healthcare professionals, researchers, industry representatives, and third-party payers.



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Symposium Presentation



Supporting Individuals to self-manage their lymphoedema — Exploring the efficacy of a new compression garment by monitoring skin tissue oxygenation

Justine Whitaker, MSc, RN Director and Nurse Consultant

- Friday, June 14
- 7:30 AM
- Acapulco Room

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General information



CONFERENCE VENUE

Hyatt Regency Chicago
151 East Wacker Dr
Chicago, IL 60601 USA

CONFERENCE LANGUAGE

The conference will be held in English.

NAME BADGES

For security reasons, all participants (including delegates, exhibitors, speakers and volunteers) must wear their name badge in the conference area at all times to gain access to the sessions and Exhibit Hall. Please ensure your badge is visible.

ENTITLEMENTS

Registration for the conference includes admission to the conference programme for the applicable days. Patient registration includes admission to the programme, coffee breaks and lunch, conference bag and abstract book.

CERTIFICATE OF ATTENDANCE & ACCREDITATION

Certificates of attendance can be downloaded from the conference website under registration after the event. You will receive an email with more details and the link to download.

Participants wishing to obtain a CME designated certificate should visit the conference website (under Registration). You will be guided through the credit claiming process with the appropriate links to the University of Chicago CME site.

An email with detailed instructions including the conference website link will be sent after the conference to all participants.

Credit Designation Statement

The University of Chicago Pritzker School of Medicine designates this live activity for a maximum of **23.0 AMA PRA Category 1 Credits™**. Physicians should claim only the credit commensurate with the extent of their participation in the activity.



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LUNCH AND COFFEE BREAKS

Lunch and coffee are available in the Exhibition Hall (Regency Ballroom C&D) and in the foyer. See programme for exact time of breaks.

POSTER SESSION

Posters are displayed in the foyer, HongKong and San Francisco rooms starting on Thursday morning, and ending at the end of the lunch hour on Friday afternoon. Poster sessions will be held during two different breaks to allow delegates to ask questions of the poster presenters, who will stand by their posters at specific times.

The poster session times are as follows

Odd numbered posters

Thursday 3.15 - 3.45pm

Even numbered posters

Friday 10.00 - 10.30am

INFORMATION FOR POSTER PRESENTERS

Poster mounting

Posters can be mounted 13 June 2019 from 7.30 am when the registration starts. The venue will provide all necessary equipment to mount the posters.

Poster removal

Posters can be removed after Friday 14 June at 1:30 (at the end of the lunch break).

Visit the poster area

Participants are encouraged to visit the poster area during the coffee and lunch breaks. Participants can attach their business card to the poster and expect to be contacted by the author during the congress or later as appropriate.

SPEAKER INFORMATION

Please bring your presentation on a USB to the session room before your session starts. We recommend that you upload your presentation at least 30 minutes before your session. You can get help with the upload, if necessary. Unless otherwise agreed all presentations will be deleted after the conference in order to secure that no copyright issues will arise at the end of the conference.

WIFI

Free WiFi is provided, courtesy of Essity. Network: JOBST, password: Relax

MOBILE PHONES

All mobile phones and other electronic devices must be on silent mode during the sessions.

LOST AND FOUND

Found items should be returned to the registration desk. If you lose something, please report to this desk for assistance.

CONFERENCE SECRETARIAT

CAP-Partner

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2000 Frederiksberg C
Denmark

Tel: 0045 70 20 03 05

www.cap-partner.eu

CONFERENCE WEBSITE

www.2019ilfconference.org

PARKING

There is valet parking at the hotel for \$69 overnight and self-parking for \$49 overnight.

Dietary Restrictions

If you indicated specific dietary restrictions, any special lunches will be labelled.

General information

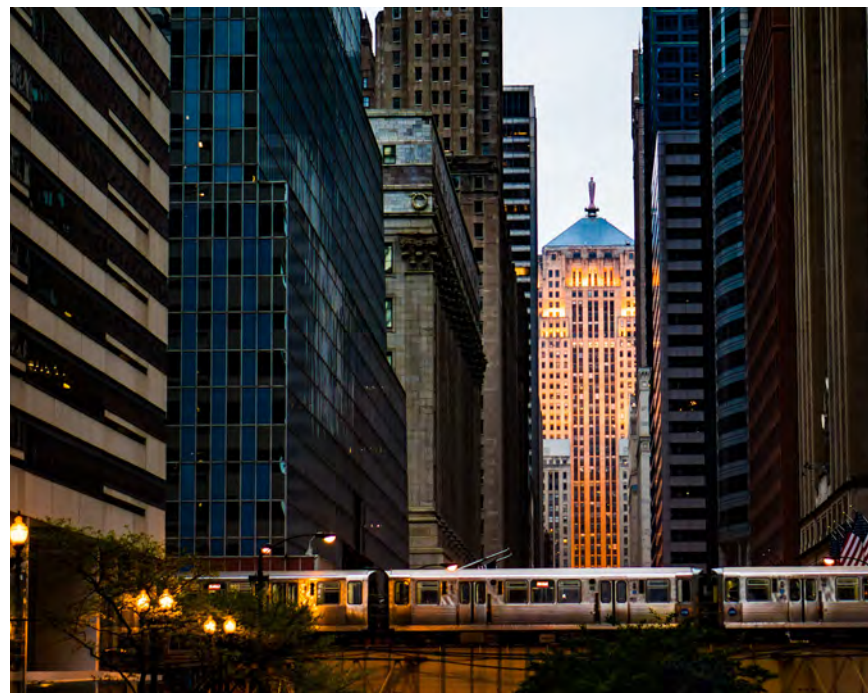
BUSINESS OFFICE

The Hyatt Hotel's business office is located in the East Tower, Exhibit Level. It is inside the Riverside Exhibit Hall.

Opening hours for the business center	
Monday through Friday	6.00am - 7.00pm
Saturday through Sunday	7.00am - 6.00pm

EXHIBITION

Exhibition Hours	
Thursday 13 June Includes welcome reception within the exhibit area from 5.30-7pm	7.30am-7pm
Friday 14 June	7.30pm-5.30pm
Saturday 15 June	7.30am-3.30pm



Social programme

WELCOME RECEPTION

Date	13 June 2019
Time	5.30 - 7.00 pm
Place	Exhibit area and conference foyer

Included in the registration fee

The welcome reception will be held right after the last session on Thursday 13 June in the exhibit area. Here you can enjoy drinks and hors d'oeuvres while catching up with colleagues and viewing the exhibit area. Make sure to be there – it will be an evening full of networking and a good start to the ILF 2019 conference. If you registered for this event, you will have received a ticket.

CONFERENCE DINNER

Date	14 June 2019
Time	6.30-9.30 pm
Place	Mystic Blue Cruises, Navy Pier

Not included in the registration fee

The conference dinner will take place on the cruise boat Mystic Blue, which will depart from Navy Pier and sail for two hours on Lake Michigan. Navy Pier is a 20 minute walk from the Hyatt conference hotel. Transportation will be provided to Navy Pier with buses departing from the hotel west tower lobby at 6pm. Boarding at the boat will be from 6.30pm. The boat sails at 7pm sharp and will be dockside again by 9pm. The boat will still be accessible until 9.30pm when final disembarkation is required.

Navy Pier offers many restaurants, bars and boutiques – so feel free to explore the area on a walk after the Mystic Blue cruise ends. Transportation back to the hotel is at your own leisure and at your own expense, but is only a quick taxi ride. Dinner tickets can be purchased at \$85USD per person and includes a dinner buffet and two drinks. Additional drinks will be available for purchase.

ILF RUN AROUND THE GLOBE

Date	15 June 2019
Time	07.30-08.30 am
Place	The lobby / Hyatt Regency Hotel

Not included in the registration fee

Support ILF by running with medi during ILF 2019! There will be two routes to choose from:

- 2 km/ 1.24 miles
- 5 km/ 3.11 miles

Everyone knows how important exercise is in the treatment of Lymphoedema and Lipoedema and how great it is to move together in a fantastic environment! In addition to organizing a scientific workshop, medi (gold sponsor) will organize for the second time during the ILF conference a sportive walk/run to promote exercise, on Saturday 15 June 2019.

The start is at 7:30am on Saturday morning. We are going to run along the beautiful "Navy Pier". There will be two routes to choose from: the choice is between 2 or 5 km routes for all participants. Running, walking, or both! Meeting point: 07:15 at the hotel west tower lobby.

It would be an honor to run together, for a healthier you and a healthier us. Also, warm greetings from your medi-team, who is already looking forward to welcoming everyone in Chicago.

The registration fee is \$10 USD and all the money will go towards benefiting developing countries attending future ILF conferences. Don't hesitate and join, it is not about who is the fastest, but who is willing to participate! In return medi will sponsor the running shirts and stockings from CEP.

Programme Thursday, June 13

	REGENCY BALLROOM A-B	
	REGENCY A	REGENCY B
7.30 - 8.30	Registration and Exhibit Hall	
8.30 - 10.15	PLENARY I Chairs: Christine Moffatt/Jane Armer Welcome Message from Conference Co-hosts: ILF and ALFP Risk Reduction Practices A point/counterpoint discussion Speakers: Judith Nudelman and Alphonse Taghain	
10.15 - 10.45	Refreshment Break and Exhibit Hall	
10.45 - 12.15	PLENARY II Chair: Mike Bernas Lymphatics in Health and Disease Speaker: Guillermo Oliver Advances in Diagnostics Speaker: Mike Bernas	
12.15 - 1.45 pm	Lunch and Exhibit Hall	
1.45 - 3.15 pm	PLENARY III Chair: Christine Moffatt Chronic Wounds and Lymphoedema Speaker: Keith Harding Compression Challenges Speaker: Gavin Hughes	
3.15 - 3.45 pm	Refreshment Break and Exhibit Hall	
3.45 - 5.15 pm	ABSTRACT SESSION Chair: Mike Bernas Imaging & Diagnostics including Assessment A Abstract Submissions	ABSTRACT SESSION Chair: Gavin Hughes Conservative Treatment including Compression B Abstract Submissions
5.30 - 7.00 pm	WELCOME RECEPTION	

ACAPULCO	TORONTO	NEW ORLEANS
Refreshment Break and Exhibit Hall		
SPONSORED SYMPOSIUM* Sigvaris 12.30 - 1.30 Improving Clinical Outcomes with Inelastic Compress Therapy	SPONSORED SYMPOSIUM* Medi 12.30 - 1.30 Compliance/Adherence in Compression Therapy Annemarieke Fleming	OPEN SPACE DISCUSSION Chair: Susan Noerregaard Developing ILF Outcome Measures
POSTER PRESENTATIONS: Session I (odd numbered posters)		
ABSTRACT SESSION Chair: Mei Fu Psychosocial & Qualitative Research C Abstract Submissions	CONCURRENT SESSION Chair: Nicole Stout Advocacy: Health Economics Round Table Discussion Speaker: Nicole Stout Speaker: Heather Ferguson	OPEN SPACE DISCUSSION Chair: Susan Noerregaard Developing ILF Outcome Measures (continued from 12:15)
WELCOME RECEPTION		

* non CME activity

Programme Friday, June 14



	REGENCY BALLROOM A-B	
	REGENCY A	REGENCY B
7.30 - 8.30	Registration and Exhibit Hall	
8.30 - 10.00	PLENARY IV Chair: Wouter Hoelen Obesity and Its Impact: A Scientific and International Perspective Speaker: Tobias Bertsch Obesity: A Clinical and North American Perspective Speaker: Paula Stewart	
10.00 - 10.30	Refreshment Break and Exhibit Hall	
10.30 - 12.00	PLENARY V Chair: Christine Moffatt Lymphedema: Newer Treatment Options Through Research Speaker: Stanley Rockson LIMPRINT: Elucidating the Global Problem of Lymphedema Speaker: Christine Moffatt Outcome Measures Project Speaker: Susan Nooregaard Showcasing ALFP projects Speaker: Jane Armer	
12.00 - 1.30 pm	Lunch and Exhibit Hall	
1.30 - 3.00 pm	ABSTRACT SESSION Chair: Pinar Borman Service Delivery & Patient Carer Engagement E Abstract Submissions	ABSTRACT SESSION Chair: Wouter Hoelen Outcome Measures F Abstract Submissions
3.00 - 3.30 pm	Refreshment Break and Exhibit Hall	
3.30 - 5.00 pm	ABSTRACT SESSION Chair: Marina Cestari Obesity & Lymphedema/Lipedema G Abstract Submissions	ABSTRACT SESSION Chair: Jay Granzow Surgery/Basic Science & Biology H Abstract Submissions
6.00 - 9.30 pm	BUS DEPARTURE for CRUISE / OPTIONAL CONFERENCE DINNER AND ENTERTAINMENT all delegates invited (signup required)	

	TORONTO Patient Program	NEW ORLEANS Interactive Program
ACAPULCO SPONSORED SYMPOSIUM* Lohmann & Rauscher Self-Care Lymphoedema management Justine Whitaker		
		INTERACTIVE SESSION Chair: Michael Bernas Anatomy & Physiology Speaker: Kathleen Francis Risk Reductions/Precautions Speaker: Melanie Thomas
POSTER PRESENTATIONS: Session 2 (even numbered posters)		
		INTERACTIVE SESSION Patient evaluation & Differential Diagnosis Speaker: Paula Stewart INTERACTIVE SESSION Diagnostic Imaging Speaker: Mike Bernas
SPONSORED SYMPOSIUM* Jobst 12:15 - 1:15 pm Managing Lipedema & Nighttime Compression Speaker: Tobias Bertsch Speaker: Linda Roherty	SPONSORED SYMPOSIUM* 3M 12:15 - 1:15 pm 2 Layers/Many Possibilities Speaker: Martina Reddick Speaker: Tim Deacock	ALFP meeting Visioning the future of Lymphedema in the USA
CONCURRENT SESSION Chair: Linda Khong Lymphedema Surgery: What Works, What Doesn't Speaker: Jay Granzow	PATIENT OPENING PLENARY Chair: Joan White Lymphedema 101 Speaker: Neil Pillar Treatment Protocol Speaker: Kathleen Francis	INTERACTIVE SESSION Chair: Melanie Thomas Lower Limb Assessment Speaker: Keith Harding Lymphedema and Infection Speaker: Tonny Karlsmark
Refreshment Break and Exhibit Hall		
CONCURRENT SESSION Workshop Pediatric QoL and self-efficacy tools for professionals & patients Speaker: Isabelle Quèrè Your Child has Lymphedema Meet the Experts Speaker: Isabelle Quèrè Speaker: Julie Hanson	PATIENT SESSION Chair: Joan White Compression 101 Speaker: Bonnie Lasinski Exercise for lymphedema Speaker: Maureen McBeth	INTERACTIVE SESSION Chair: Kathryn Thrift Standard of Care Speaker: Guenter Klose Speaker: Marcia Beck
BUS DEPARTURE for CRUISE / OPTIONAL CONFERENCE DINNER AND ENTERTAINMENT all delegates invited (signup required)		

* non CME activity

Programme Saturday, June 15

	REGENCY BALLROOM A-B	
	REGENCY A	REGENCY B
7.30 - 8.30	Registration and Exhibit Hall MEDI FUNDRAISING RUN (meet in hotel west tower lobby)	
9.00 - 10.30	PLENARY VI Chair: Christine Moffatt/ Joseph Feldman Welcome Message and awards Thriving with Lymphedema Speaker: Sophia Hanson The Changing Field of Lymphatics Speaker: Stanley Rockson	
10.30 - 11.00	Refreshment Break and Exhibit Hall	
11.00 - 12.30	PLENARY VII Chair: Mike Bernas Primary Lymphoedema and the Diagnostic Algorithm Speaker: Kristiana Gordon Lymphedema/Lipedema and Nutrition Speaker: Paula Stewart	
12.30 - 1.30	Lunch and Exhibit Hall	
1.30 - 3.00	ABSTRACT SESSION Chair: Sandro Michelini Innovative and Promising Approaches I Abstract Submissions	ABSTRACT SESSION Chair: Marcia Beck Risk Reduction J Abstract Submissions
3.00 - 3.30	Refreshment Break and Exhibit Hall	
3.30 - 5.00	CLOSING PLENARY VIII Chair: Neil Piller Innovative and Promising Approaches Speaker: Neil Piller Ongoing projects and future vision of the ILF and ALFP Closing Remarks Announcement of ILF 2020 Conference	

	ACAPULCO	TORONTO	NEW ORLEANS
	 PATIENTS JOIN OPENING PLENARY SESSION		
	Refreshment Break and Exhibit Hall		
		PATIENT SESSION Chair: Kathryn Thrift Self-Management & Risk Reduction Tips Speaker: Julia Rodrick Psychosocial Aspect Speaker: Stephanie Ross	PATIENT SESSION Chair: Melanie Thomas Technology and Lymphedema Speaker: Melanie Thomas Obesity and Lymphedema Tobias Bertsch
	Lunch and Exhibit Hall		
	CONCURRENT SESSION Chair: Isabelle Quere Paediatric Lymphoedema Workshop K Abstract Submissions	PATIENT SESSION Chair: Bonnie Lasinski Surgical Interventions Speaker: Jay Granzow Ask the Expert Jay Granzow, Kathleen Francis, Bonnie Lasinski	ABSTRACT SESSION Chair: Anna Kennedy Community Organization & Education Initiatives L Abstract Submissions
	Refreshment Break and Exhibit Hall		
	 PATIENTS JOIN CLOSING PLENARY SESSION		

Speaker presentations

Plenary I: In Support of Lymphedema Risk-reduction Behaviors.

Judith Nudelman

Lymphedema is a clinical diagnosis, with variable onset and an often-unpredictable and dynamic clinical course, so any data may have inconsistent interpretation. Empiric, measurable definitions of lymphedema are inherently arbitrary and large, randomized control trials are almost non-existent. Clinical experience is relevant in a clinically-defined disease. Risk factors vary throughout the literature, and not all risk factors identified-to-date are modifiable. True risk involves damage to both the lymphatic system and the vigor of the lymphatic system. Risk-reduction behaviors include both patient behaviors and medical intervention. Risk-reduction behaviors involve truly-informed decision-making, and should include the medical value of interventions that damage lymphatics, as well as patient behaviors. Clinicians and patients are united in their desire for optimal survivorship and functional outcomes with minimal morbidity, so consensus, patient education, and shared decision-making are imperative.

Plenary I: Precautionary measures: the need for evidence-based guidelines

Alphonse Taghian

For decades of clinical practice, providers have instructed patients undergoing breast cancer surgery to minimize the risk of developing breast cancer-related lymphedema (BCRL) by avoiding blood pressure measurements, infusions, injections in and on the at-risk arm; using compression sleeves during air travel; and avoiding temperature extremes. These recommendations evolved from an abundance of caution given limited knowledge of BCRL, but not from sound clinical proof. Given the BCRL-risk is lifelong and patients are fearful of its development, patients report strict adherence to these guidelines. However, there are situations wherein adherence to these guidelines is burdensome for patients. Over the past decade, evidence has been evolving regarding precautionary measures. The Lymphedema Research Program at Massachusetts General Hospital has systematically approached precautionary measures research through literature review, data collection, and the generation and publication of evidence. This research has impacted clinical practice and current guidelines. Research to date and the current state of precautionary measures will be objectively summarized and recommendations for future work in this area will be made. The goals of establishing evidence-based guidelines are to ensure that practitioners can best guide patients as to their individual risk, helping patients to make safe decisions whilst minimizing risk of BCRL and maximizing quality of life. An open dialogue is encouraged to help forward this work.

Plenary II: Lymphatics in Health and Disease

Guillermo Oliver

Essential for homeostasis, the lymphatic vasculature regulates tissue fluid levels, immune function, and the absorption of lipids from the intestinal tract. This vascular network also provides immune defense, protecting the body from bacteria or viruses. In the last few years the lymphatic network has been shown to also be involved in the development and progression of diseases such as obesity, hypertension, glaucoma, cardiovascular diseases and neurological disorders. Defects in the lymphatic vasculature contributes to several chronic inflammatory conditions, including rheumatoid arthritis, inflammatory bowel disease, asthma, chronic airway inflammation, atopic dermatitis, and psoriasis. I will summarize some of these recent findings and present new results aiming to identify biomarkers of lymphatic malfunction.

Plenary II: Advances in Diagnostics

Michael Bernas

This session will review some current technologies in use as well as explore technologies on the near horizon. The focus will be on practical uses of technologies with the understanding of limited resources and opportunities that may not allow widespread utilization. Basic principles will be explored to generate the strengths and weaknesses of various technologies so that participants can develop a good understanding of current diagnostic technologies for assessing multiple forms of lymphedema.

Speaker presentations

Plenary III: Chronic Wounds and Lymphoedema

Keith Harding

Wounds are a common and challenging clinical problem. Similarly Lymphoedema is a common and challenging clinical problem. Many patients have to deal with both conditions and as such have a direct impact on each other. The frequency with which wounds and lymphoedema occur is only just being realized. As such there are significant challenges and opportunities for improving understanding and management of patients with these conditions. There are a wide range of diseases that result in wounds that are difficult to treat and the same is true for patients with lymphoedema. It is unlikely that effective treatment choices will be made until a clinician has made a diagnosis of the underlying disease and control of factors that are modifiable that are present that are delaying healing.

The increasing awareness of veno-lymphoedema as a cause for non healing lower limb ulcers is an example of the need for wound healing clinicians and lymphoedema specialists to work together. The challenge of delivering care to patients with complex clinical problems will only be addressed when an appropriately skilled team of clinicians come together to focus on individual patients problems. The comprehensive assessment, accurate diagnosis and effective treatment choice for each patient will lead to much improved care of patients and an inter or multi disciplinary approach is essential for patients with these problems. Building of teams is essential if progress is to be made in this area of clinical practice.

Plenary III: Compression Challenges

Gavin Hughes

The Surgical Materials Testing Laboratory (SMTL) is an ISO 17025 accredited medical device testing laboratory, part of the UK National Health Service (NHS) funded by the Welsh Government. Our core service is to provide medical device testing and technical services to enable NHS procurement bodies to undertake evidence based purchasing.

This presentation will outline the projects the SMTL have undertaken in conjunction with lymphoedema clinicians to independently assess compression garments supplied by manufacturers for national procurement contracts. The presentation will focus on laboratory testing that measures the pressures exerted by garments. The test results have identified numerous quality issues with garments supplied in the market, and raises the question whether clinicians really know the pressures applied by lymphoedema compression garments?

To conclude the presentation, pressure classes stipulated in different countries will be discussed and the resulting confusion this causes for users, clinicians and manufacturers.

Plenary IV: Obesity and Its Impact

Tobias Bertsch

Obesity is a killer disease- a killer disease like cancer! Most of the world's population live in countries where overweight and obesity kills more people than underweight and in the US we see the first generation that will have a shorter life expectancy than their parents.

Evolution has turned humans into beings that are designed to face hunger crisis and bad times by maximally using calories. However, this survival advantage has become a disadvantage and has led to the obesity epidemic.

The causes of this epidemic are multiple and complex. This talk gives an overview on these different causes but also on the medical and social impact of this disease on our patient's quality of life.

Furthermore, it should be noted that our "traditional" therapeutic approach does not lead to an improvement of this situation. Instead, we have to think out of the box – what also is part of the talk.

Plenary IV: Obesity and Lymphedema and the North American perspective

Paula Stewart

Obesity remains a health epidemic throughout North America and a growing issue around the world. We will briefly explore some of the causes of this epidemic some of the solutions that have been put forward and the impact of obesity on the development of lymphedema. Finally, we will look specifically at how to best treat the obese patient with lymphedema.

Speaker presentations

Plenary V: Lymphedema: Newer Treatment Options Through Research

Stanley Rockson

Historically, lymphedema has been viewed by patients, scientists, and clinicians as a pathological failure of tissue plumbing. Newer insights into the disease pathogenesis suggest that the circulatory failure in lymphedema is a late consequence of tissue inflammation. These insights have the capacity to identify new and effective treatment resources. Lymphatic repair is complex and can be augmented both pharmacologically and surgically. Research is leading to enhanced approaches in both arenas.

Plenary V: International Lymphoedema Framework: Special Edition Free Access LIMPRINT: Elucidating the Global Problem of Lymphedema

Christine Moffatt

For those who study the lymphatic system, and for those who administer medical care to lymphatic patients, it is an inescapable conclusion that lymphedema is a disorder that is a commonly encountered, difficult, universal medical problem. Nevertheless, paradoxically, medical practitioners and the lay public alike persistently and erroneously believe lymphedema to be a rare disorder, or one of only historical interest.¹ Accordingly, reliable incidence and prevalence data for lymphedema have been elusive or nonexistent. Published prevalence estimates for the population generally derive from extrapolations related to the soft data surrounding the relevant cancers and infections that predispose to acquired lymphedema.^{2–4} Data derived from health care databases, although helpful, likely underestimate the magnitude of disease burden through under-reporting of relevant diagnostic codes by the responsible health care professionals.⁵ Without data to support the extensive impact of this disease, supportive responses from government, industry, and third-party payers are not forthcoming,¹ all of which serves to perpetuate this individual and public health problem.

Thanks to groundbreaking efforts undertaken by the International Lymphoedema Framework (ILF), this paradoxical and problematic information gap has been addressed. The ILF, an international organization dedicated to the problems of the lymphedema community, has coordinated and completed the Lymphedema Impact and Prevalence—International Lymphedema Framework (LIMPRINT) project, an international study designed to define the scope and impact of chronic edema across the international landscape, with the intent of creating an evidence base to support the development of, and reimbursement for, lymphedema services. Coordinated by ILF through its participating national frameworks, the study was conducted in 40 sites distributed through 9 countries. The international data set of >13,000 patients was supported by an electronic data capture system and validated data collection tools.

The preliminary analysis of this extensive data set was presented at the Seventh International Conference of the ILF in Siracusa, Italy in 2017. It is a great privilege for Lymphatic Research and Biology to communicate here the results of this monumental undertaking that illuminates, in very objective terms, the disease burden and population risk of chronic edema throughout the world. Through the 17 articles published in this issue of the journal, the entire scope of the project can be appreciated. In this issue, the authors have documented the concept of the study and development and validation of the methodology, which has permitted estimation of the prevalence of chronic edema and lymphedema in the acute hospital setting, in specialist lymphedema services, and in community nursing services. The clinical and ethical challenges of vulnerable populations are addressed, as are the health-related quality-of-life and sociological concerns.

The global reach of this project is represented through analysis of the data derived from Australia, Canada, Denmark, Japan, Turkey, and the United Kingdom, respectively. Finally, in a very unique and instrumental analysis, three final articles address the unique challenges related to the problem of lymphedema management in children and adolescents.

The work of ILF is laudable and invaluable. With the availability of this incisive data set, one can envision a paradigm shift in which the international health care approach to chronic edema and lymphedema will arrive at more equitable solutions for this large segment of the non-healthy population. It is a distinct honor for this journal to convey the results of LIMPRINT to the scientific medical literature.

Speaker presentations

Plenary VI: The Changing Field of Lymphatics

Stanley Rockson

Lymphatic science has suffered from decades of relative neglect, but the future is bright. Over the last ten years, there has been a remarkable growth of insights into the development, structure, function, and pathology of the lymphatic circulation. These developments have led to exciting changes in governmental support for research, medical publication and practice.

Plenary VI: Thriving with Lymphedema

Sophia Hanson

I was diagnosed with primary lymphedema when I was fifteen. It gripped me suddenly one afternoon after cross country practice. My left ankle ballooned painfully, swelling to twice its size. I thought I had just sprained it, but didn't remember falling. What followed this startling onset was six months of medical tests, scans, doctors, and sleepless nights. No one knew what was wrong with me—a healthy, skinny varsity cross country runner with no detectable injuries.

When I was diagnosed with lymphedema, I was initially relieved. The relief of having a diagnosis was quickly overshadowed by dread. No one knew if my lymphedema was going to get worse, if it was going to spread to other parts of my body, if I would be disabled by it. It was terrifying, and I was decidedly alone. Not only did the majority of my peers not understand what lymphedema was, the majority of lymphedema patients were much older than me. I had no one to connect with, no one to tell me it was going to be okay. Just a promise that I would always have a clunky swollen leg and a beige stocking to match, and that was assuming things didn't deteriorate.

Now, as I approach my twenty-third birthday, I can say with absolute confidence that lymphedema has neither ruined nor dominated my life. In fact, it is merely a small facet of my identity. Due to my relatively quick diagnosis, access to treatment, and diligent management of my condition, my lymphedema has remained in check. Thus, I remain a prime example of why early access to affordable treatment is so critical, something my mother, a physician, and I spent several years advocating for with the Lymphedema Treatment Act. Ultimately, what I want to assure fellow patients, particularly the young ones, of is that it is possible to lead a full and happy life with lymphedema. You have lymphedema—it doesn't have you.

Plenary VII: An Update on Primary Lymphoedema and the Diagnostic Algorithm

Kristiana Gordon

Primary lymphoedema occurs as a result of a genetic predisposition causing the lymphatic system to fail to develop normally, or to be maintained adequately, causing abnormal drainage of lymph which results in swelling of the affected region. Primary lymphoedema may occur as an inherited condition, or less commonly as part of a complex syndromic disorder (Connell, Brice et al 2010). A patient with primary lymphoedema may only have problems with swelling, but some forms of primary lymphoedema occur in association with other health problems e.g. congenital heart disease, systemic/internal lymphatic abnormalities (fluid around the heart or lung), or very rarely haematological malignancy (leukaemia).

Primary lymphoedema is not one disease, but the presenting feature of several distinct clinical entities. Historically, primary lymphoedema was categorised into three groups depending on the patient's age at onset of swelling: lymphoedema congenita (presenting at birth), praecox (pubertal onset) or tarda (onset after 35 years of age). Mutations in several genes are known to cause primary lymphoedema. Some, but not all, of these genes have been shown to play a role in lymphangiogenesis (the process of developing and maintaining a healthy lymphatic system). The discovery of these gene mistakes has changed our diagnostic approach in the clinic, which is now based on clinical phenotyping (the process of associating a patient's lymphoedema with other health problems) and genotyping (DNA tests looking for the underlying causal gene mistake) in addition to age of onset of swelling.

Our experience and research has led us to realise that primary lymphoedema can be broadly divided into five different categories. Causal gene mistakes have been identified for a number of disease subtypes within the five categories. We have developed a colour-coded diagnostic pathway that describes specific primary lymphoedema phenotypes and guides the clinician on gene tests that may be available for their patient (Connell, Gordon et al 2013).

The diagnostic pathway helps the clinician to offer appropriate genetic testing (assuming the underlying gene mistake is known), and screen and treat for associated health problems. Patients and families benefit hugely from receiving a formal genetic diagnosis of their primary lymphoedema as it allows the clinician to confidently predict the clinical prognosis and offer screening for family members. In addition, use of this pathway has facilitated our discovery of new causative genes, as we analyse and compare the DNA of patients with similar patterns of lymphoedema and other health problems. We are hopeful that this ongoing research will aid the development of improved treatment options.

References:

A new classification system for primary lymphatic dysplasias based on phenotype. Connell F, Brice G, Jeffery S, Keeley V, Mortimer P, Mansour S. *Clinical Genetics* 2010;77(5):438-52. The classification and diagnostic algorithm for primary lymphatic dysplasia: an update from 2010 to include molecular findings. Connell F, Gordon K, Brice G, Keeley V, Jeffery S, Mortimer P, Mansour S, Ostergaard P. *Clinical Genetics* 2013;84(4):303-314.

Speaker presentations

Plenary VII: Lymphedema, Lipedema and Nutrition

Paula Stewart

The audience will learn how lymphedema and lipedema differ from each other. Further we will explore how lipedema specifically can evolve into a lipo-lymphedema. Finally, we will turn our focus to what is known about the impact of diet on the development and management of lymphedema and lipedema.

Plenary VIII: Innovative and promising approaches

Neil B Piller

We cannot be (and should never be) content with where we are today in terms of lymphoedema presentation and the reasons for it, its early identification, treatment and management, their costs and its associated sequelae and their impact on quality of life.

We are not perfect and we are likely to always lack the wide range of clinical trial information to inform us about what is 100% best for our patients, but we have other sources of information which can guide us. This Conference has given some of those information points and we will act on them, but what is most important is to look to the future.

What can we do to reduce the risk of lymphoedema development, how can we detect it earlier, how do we ensure targeted and appropriately sequenced treatment and what can we do to best acknowledge the patient and their problem as being unique and personal and yet ensure they feel supported and together?

We have improved surgical and radio-therapeutical options, we have better understanding of the genetics behind lymphoedema development and are using bio-impedance and other techniques to detect small and subtle changes in a limb. We are better able to target treatments with the use of Indocyanine Green and we are better able to sequence them with improved understanding of the tissue changes which occur. But we don't have all the answers yet, but they are out there, and it's often other fields and young researchers which lead us to them. Come and listen to our innovative and promising approaches session and see your and our future – who knows you could be part of the leading edge in it!

Notes

A Thursday 3.45 - 5:15 pm

ABSTRACT SESSION IMAGING & DIAGNOSTICS INCLUDING ASSESSMENT

1. Reliability of Circumferential Measurements for Assessment of Upper Extremity Lymphedema
Yuanlu Sun
2. Assessing segmental limb volume changes for early detection of breast cancer-related lymphedema
Kayla M. Daniell
3. Ultrasound - Better in hand than dismissed out of hand
W. Jungkuz
4. Comparison of Dielectric and L-Dex Values of Patients after Breast Cancer Surgery: A Pilot Study
Yeşim Bakar
5. Tissue dielectric measures on the trunk in women with and without trunk lymphedema
Linda Koehler

B Thursday 3.45 - 5:15 pm

ABSTRACT SESSION CONSERVATIVE TREATMENT INCLUDING COMPRESSION

1. Effectiveness and dosing of early CLT treatment in a screening-based cohort of patients at high risk of breast cancer-related lymphedema
Cheryl Brunelle
2. Positive outcomes observed with the incorporation of compression bra and specialized pad to address swelling and tissue fibrosis following treatment for breast cancer
Suzie Ehmann
3. Protocol of a randomised controlled trial regarding the effectiveness of fluoroscopy-guided manual lymph drainage for the treatment of breast cancer-related lymphoedema
Tessa De Vrieze
4. Exercise in patients with cancer-related lymphedema in the lower limbs. Results from a feasibility trial on High Intensity Interval Training (HIIT) with and without compression garments
Merete Celano Wittenkamp
5. Do women with lower-limb lymphedema use more ankle muscle co-contraction to maintain balance during quiet standing?
Nancy St-Onge

C Thursday 3.45 - 5:15 pm

ABSTRACT SESSION PSYCHOSOCIAL & QUALITATIVE RESEARCH

1. Parenting a Child with Primary Lymphedema: A Continuum of Protection
Elise Radina
2. Multifactorial challenges to engagement in lymphoedema management: Disengaged patients' perspectives from a metropolitan hospital outpatient clinic in Australia
Linda Khong
3. Living with Leg Lymphedema: Exploring the Quality of Life and Disease Education of Individuals Experiencing Cancer-Related Leg Lymphedema
Catharine Bowman
4. A qualitative study of the experiences of women with lipoedema in Scotland
Anne Williams
5. Breast cancer-related lymphedema and quality of life: A qualitative analysis over years of survivorship
Allison Anbari
6. Risk Factors Associated with Increased Fear of Breast Cancer-Related Lymphedema and Avoidance Behaviors
Tessa C. Gillespie

D Thursday 3.45 - 5:15 pm

ABSTRACT SESSION HEALTH ECONOMICS

1. Cost-Effectiveness Analysis of Prospective Surveillance Versus an Impairment-Based Model of Care for Breast Cancer-Related Lymphedema
Stephen Patrice

E Friday 1.30-3.00 pm

ABSTRACT SESSION SERVICE DELIVERY & PATIENT CARER ENGAGEMENT

1. Lymphoedema after breast cancer treatment - Primary Preventive Protocol: five years follow-up
Marina Cestari
2. Prevention and Education through Healthy Leg Clinics in Primary Care
Pippa McCabe
3. The Development of Key Performance Indicators using the Delphi Technique for a Regional Lymphoedema Service in Ireland.
Meadbh McSweeney
4. The effect of early intervention on early stage of breast cancer-related lymphedema
Qian Lu
5. Interval regimen affords increased patient concordance and compliance for optimal oedema management system
Karen Bock
6. The only way for treating lymphedema is Multi disciplinary approach
Tim Decock
7. Effectiveness of a combined approach of team work in a complex case of localized multiple elephantiasis
Marina Cestari

F Friday 1.30-3.00 pm

ABSTRACT SESSION OUTCOME MEASURES

1. Normative data of breast Tissue Dielectric Constant (TDC) using the LymphScanner
Jane Wigg
2. Reliability of the MoistureMeter D compact device and the pitting test to determine local tissue water in subjects with breast cancer-related lymphoedema
Nele Devoogdt
3. What is the best method to determine excessive arm volume in patients with breast cancer-related lymphoedema in clinical practice? Reliability, time-efficiency and clinical feasibility of five different methods
Tessa De Vrieze
4. Bone loss in the affected forearm patients with breast cancer-related lymphedema: a controlled study
Secil Vural
5. A Prospective Clinical Trial in Women with Node-positive Breast Cancer Treated with Neoadjuvant Chemotherapy and Axillary Dissection: Factors Associated with Lymphedema (ACOSOG Z1071: Alliance for Clinical Trials in Oncology [ALLIANCE])
Jane Armer
6. A multi-center survey to assess the outcomes of Fluoroscopy Guided Manual Lymphatic Drainage (FG-MLD) using Belgrado 'Fill and Flush' technique
Jane Wigg
7. A preliminary analysis of patients screened for early breast cancer-related lymphedema using volumetric arm measurements and bioimpedance spectroscopy: A complementary role
Tessa C. Gillespie
8. A pilot study exploiting 3D scanning technology in lymphoedema for accurate measurements of volume and shape
Cheryl Pike
9. Revision of the Casley-Smith MLD routine based on ICG scanning
Cheryl Pike

G Friday 3.30-5.00 pm

ABSTRACT SESSION OBESITY & LYMPHEDEMA/LIPEDEMA

1. Stadiation of Lipedema by the clinical and instrumental support
Sandro Michelini
2. Women with lipedema have leaky capillary dermal skin vessels compared to controls
Marisol Allen
3. Chronic pain in lipoedema: are there indicators for nociceptive, neuropathic or central sensitization pain?
Wouter Hoelen
4. The clinical characteristics of lipedema patients and awareness about lipedema in a group of patients referred to a lymphedema unit
Pinar Borman
5. The Effect of Lipedema on Gait - a Case-Control Study
Polly Armour
6. Diagnosed: Now what?
Andrea Brennan
7. Body Mass Index (BMI) Trends over Seven Years for Persons with Breast Cancer-Related Lymphedema (BCRL)
Allison Anbari

H Friday 3.30-5.00 pm

ABSTRACT SESSION SURGERY/BASIC SCIENCE AND BIOLOGY

1. Development of lymphatic wire for detection of lymph collectors in treatment of peripheral lymphedema
Jiro Maegawa
2. Aligned Nanofibrillar Collagen Scaffolds Can Treat Induced Lymphedema in Rats
Tatiana Zaitseva
3. Acquired lymphatic pump failure and therapeutic restoration in a mouse model of lymphedema
Brandon Dixon
4. Phenotypic aspects of primary lymphoedema in CELSRI mutations
Sandro Michelini
5. Physical and surgical tretment in primary and secondary lymphoedema: clinical results
Sandro Michelini

I Saturday 1.30-3.00 pm

ABSTRACT SESSION INNOVATIVE AND PROMISING APPROACHES

1. Artificial drainage of lymphatic fluid: towards the clinical testing of an implantable pump for the treatment of chronic edema
Valentina Triacca
2. Intermittent Pneumatic Compression and the Effect of Different Compression Sequencing for Treating Lower Limb Lymphoedema
Nyree Dunn
3. Are compression therapists too superficial? Quantifying limb compression through pressure measurements at the skin surface.
Neil Pillar
4. Patterns of Lymphedema Symptomatology: Phenotypic and Biomarker Characterization
Mei Fu
5. Digital Therapy for Chronic Pain Following Breast Cancer Treatment
Mei Fu
6. The Pelvic Floor's Involvement in Genital Lymphedema and So Much More
Shelley DiCecco

J Saturday 1.30-3.00 pm

ABSTRACT SESSION RISK REDUCTION

1. Prevention of Lymphoedema after Axillary Clearance (ANC) by External Compression Sleeves Randomised Trial: Results of PLACE trial
Nigel Bundred
2. Risk factors for cording in patients treated for breast cancer and at risk for breast cancer-related lymphedema
Cheryl Brunelle
3. Bioimpedance spectroscopy and limb volume measurement in the early detection of upper limb lymphoedema after axillary node clearance for breast cancer.
Vaughan Keeley
4. Postoperative Weight Fluctuations May Increase Risk of Breast Cancer Related-Lymphedema
Sacha Roberts
5. Identifying risk factors for low-volume breast cancer-related lymphedema: results from a prospective screening program
Alphonse G. Taghian
6. Early compression therapy and individualized exercise in women treated for gynecological cancer: preliminary findings of a pilot randomized controlled trial
Shirin Shallwani

K Saturday 1.30-3.00 pm

ABSTRACT SESSION PEDIATRIC

1. Challenges in the world of pediatric lymphedema
Catherine McCuaig
2. The clinical and demographic characteristics of pediatric lymphedema patients: a multicenter study-preliminary report
Pinar Borman
3. Lymphoedema Network Wales Children and Young Adult's Service Audit
Cheryl Pike
4. The use of lymphoscintigraphy in the investigation of pediatric lymphedema
Cathrine McCuaig

L Saturday 1.30-3.00 pm

ABSTRACT SESSION COMMUNITY ORGANIZATION & EDUCATION INITIATIVES

1. American Lymphedema Framework Project (ALFP) Survey of Lymphedema Therapists: A 2018 Update
Elizabeth Anderson
2. 2009-2019: A decade of making a difference in the Canadian lymphedema community
Anna Kennedy
3. Shaping lymphoedema research in the UK: a British Lymphology Society Scientific Committee Initiative
Rhian Noble-Jones
4. Possible risk factors for cellulitis experience in lymphoedema patients in Japan: secondary analysis using national LIMPRINT database
Gojiro Nakagami
5. Opportunities and challenges of performing on-site human subjects research at patient-friendly medical conferences
Polly Armour
6. A standardized and transparent approach to developing clinically-relevant practice guidelines for persons at risk of and with lymphedema
Allison Anbari
7. Knowledge of the lymphatic system and of effective self-MLD
Margareta Haag
8. Professional Guide to Compression Garment Selection - Taking compression garment prescription in S.T.R.I.D.E. (An algorithm incorporating both textile characteristic and edema presentation to optimize medical compression garment selection)
Suzie Ehmann

Poster abstracts

No.	Title	First name	Last name
P1	Nutrition Guidelines for the Management of Lymphedema	Jean	LaMantia
P2	Lymphoedema management activity in urban area, tanzania	Cecilia	Uisso
P3	Can TDC (tissue dielectric constant) measurements be used to detect edema / dermal fluid in lipoedema patients	Katinka	Rutjens
P4	Scaling Up Treatment of Chronic Lymphedema Secondary to Wuchereria bancrofti Infection in Tanzania.	Omega	Edwards
P5	Usefulness of functional assessment of post-mastectomy patients qualified for breast reconstruction procedure using patients own tissue- a preliminary report.	Rita	Hansdorfer-Korzon
P6	Impact of Breast Cancer-related Lymphedema on Survivors' Return to Work and Quality of Life in Ghana	Miriam	Owusu Sekyere
P7	The Influence of Breast Cancer-related Lymphedema on Survivors' Return-to-Work	Yuanlu	Sun
P8	Healthy Legs Class-A Step Forward in the Management of Chronic Leg Oedema	Lynne	Whiteside
P9	Reduced tissue fibrosis with addition of textured compression garments to edema management program	Karen	Bock
P10	The use of night time garments for chronic edema management impacts patients' quality of life and edema management	Suzie	Ehmann
P11	Technologies for Personalized Nutrition	Chuck	Ehrlich
P13	Relationship between contents of breast cancer treatments and lymphatic venous anastomosis in the patients with breast cancer related lymphedema	Midori	Tsukagoshi
P14	Lymphedema-flow: What are you for me? Friend or enemy?	Marielena	Papageorgiou
P15	Efficacy and safety of compression bandages for chair-bound elder persons with chronic leg edema in a Japanese special nursing home: a pilot study	Terumi	Ueda
P16	Uncompromised Compression	W.	Jungkunz
P17	Appropriation of Evidence for Guidelines	Janet	Massey
P18	Compression Therapy - Practical Problems and Innovative Solutions	Arun	Gogia
P19	Adopting a new e-communication approach	Jane	Rankin

No.	Title	First name	Last name
P20	Lymphoedema Network Northern Ireland: 10 Year review and 5 Year Forward Plan	Jane	Rankin
P21	How many lymphedema patients have problems with foot and toe?	Angelique	wiene van Ooijen
P22	Graded negative pressure: Does it have a place in the CDT treatment model?	Paula	Donahue
P23	Use of Kinesiotape in the management of neck lymphedema after oropharyngeal carcinoma	Virtu	Arora
P24	Declining and low reimbursement rates may become a limiting factor to physical therapists providing community-based lymphedema care in the private practice setting	Maureen	McBeth
P25	Role of Complete Decongestive Therapy (CDT) in Chronic Venous Leg Ulcer (VLU) Healing.	Virtu	Arora
P26	National Lymphoedema Framework Ireland - Childrens Lymphoedema Camp	Norah	Kyne
P27	Chronic Lower Limb Oedema in a Population of Saudi Arabia Residence with Multiple Sclerosis: An Evaluation of Progressive Resistance Exercises.	Asma	Alderaa
P28	Finger swelling resulting from distal lymphatic abnormality following axillary surgery	Nadia	Van Diepen
P29	Lipedema -The challenges and the Frustrations -Treatment options	Linda-Anne	Kahn
P30	Incidence of Lipedema in the state of Qatar: A data collection between (2016-2018).	Sumaiya	Sobani
P31	A Faculty Survey on the Status of Lymphology Education in Entry-Level Doctorate Physical Therapy Programs	David	Doubllestein
P32	The prevalence of lymphedema related symptoms in women treated with radiotherapy for gynecological cancer in South Africa	Lize	Maree
P33	Streptococcal Sex Syndrome- An Unusual Complication of Lymphoedema	Bernadette	Hannon
P35	A Case Study of the treatment of an individual with complex abdominal lymphedema	Vivian	Dim
P36	Case report to demonstrate the need for selection criteria for optimal adjustable Velcro wrap prescription	Karen	Bock
P37	Feasibility of MOBIDERM® use a self-bandage by secondary lower lymphedema patients: A case study.	Mihoe	Katayama
P38	A new compression garment for patients with primary lymphoedema?	Justine	Whitaker

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Poster abstracts



No.	Title	First name	Last name
P39	Can a new compression garment improve tissue health?	Justine	Whitaker
P40	Lower extremities with oedema and daytime activities among elderly individuals in a nursing home: preliminary study	Aya	Sato
P41	Lipedema and diets, does it work?	Ellen	Kuijper-Kuip
P42	Implementation of patients care activities parallel with Mass Drugs Administration (MDA) in Tanzania endemic areas	Wilfred Lazarus	Mandara
P43	Significant Improvement in Quality of Life After Treatment of Lower Extremity Lymphedema with Negative Pressure Application	Adrien	MacKenzie
P44	Secondary leg lymphedema development and delayed wound healing after Coronary Artery Bypass Graph surgery vein harvesting in an at risk limb: CDT management with wound healing in 2 weeks	Ann	DiMenna
P45	Sclerosis of papillomatosis	Sandrine	Mestre Godin
P46	Reduction Kit versus Short Stretch Bandaging Outcomes in the Reduction Phase of Complete Decongestive Therapy: Case Report	Jamie	Carlson
P47	Limited usability of lymphoscintigraphy in follow-up of primary lymphedema	Rita	Hansdorfer-Korzon
P48	Limited usability of lymphoscintigraphy in follow-up of primary lymphedema	Rita	Hansdorfer-Korzon
P49-62	Outcome Measures Survey Posters from various countries		

Sponsor directory



Platinum sponsors

Stand	Company	Description
B20	JOBST www.jobst.com	JOBST, an Essity brand JOBST aims to improve the quality of life for those suffering from venous and lymphatic diseases. It provides a number of compression garments designed to offer highly effective, therapeutic compression for the management of diseases including varicose veins, deep vein thrombosis, chronic venous insufficiency, peripheral edema and lymphedema. This includes the extensive JOBST product range, which comprises ready-to-wear, custom-fit, circular-knit and flat-knit garments for the upper and lower limbs. More information at: www.jobst.com
		
B22	Sigvaris www.sigvaris.com	SIGVARIS is the global market leader in the manufacture of medical compression garments.
		



Gold sponsors

Stand	Company	Description
C02	Medi www.medi.de	Medi is one of the world's leading manufacturers of compression hosiery. medi supplies medical compression and antiembolism stockings, lymphedema sleeves, wound care products and orthopaedic products.
		
C14	3M www.3m.com	At 3M, we apply science in collaborative ways to improve lives daily. Our 90,000 employees connect with customers around the world. Extensive research, design and testing led 3M scientists to develop 3M™ Coban™ 2 Layer Compression System, a breakthrough in compression therapy with the potential to change the practice of lymphedema intensive therapy.
		





Silver sponsors

Stand	Company	Description
A02	Juzo www.juzo.com	At Juzo, we put all our experience and passion into developing medical aids that accompany patients during their treatment. Our compression garments, supports and orthoses are manufactured using state-of-the-art technologies and offer patients a tailored solution to their specific needs. We employ around 1000 people worldwide and offer products for the areas of lymphology, phlebology, scar therapy and orthopedics which are manufactured at the headquarters in Aichach (Germany) and being exported to over 60 countries. We are giving our best every day to ensure that our products improve the patients' quality of life and provide lasting relief for their symptoms.
		
A14	Cizeta Medicali www.cizetamedicali.com	Cizeta Medicali S.p.A. is the Italian leader manufacturer of medical stockings, with a policy based on a continuous research of new solutions for venous and lymphatic diseases, identified in innovative and high quality products, certified by prestigious International institutions.
		

Bronze sponsors



Stand	Company	Description
B10	Tactile Medical www.tactilemedical.com/	Tactile Medical is a leader in developing and marketing at-home therapy devices for the treatment of lymphedema and chronic venous insufficiency. Our unique offering includes advanced, clinically proven pneumatic compression devices, as well as continuity of care services provided by a national network of product specialists and trainers, reimbursement experts, patient advocates, and clinicians. Tactile Medical takes pride in the fact that our efforts help increase clinical efficacy, reduce overall healthcare costs and improve the quality of life for patients with chronic conditions.
		
B04	Lympha Press www.lymphapress.com/	For over 35 years, Lympha Press® has produced the most-well regarded dynamic compression therapy products distributed around the world. Our devices and patented garments have helped patients all over the world deal with lymphedema and venous insufficiency and improve their quality of life. Lympha Press offers the world's most versatile and advanced dynamic compression therapy systems with proven clinical evidence in over 20 peer-reviewed publications. Results oriented patient care is at the forefront of our focus. Patient testimonies attest to the quality of our products and the service they receive from Lympha-Press teams around the world.
		

Exhibitors

Stand	Company	Description
C12	Delfin Technologies www.delfintech.com/ 	Delfin Technologies Ltd has specialized in the assessment of tissue properties in skin and subcutis. In lymphology, the MoistureMeterD devices, LymphScanner and SkinFibroMeter are unique devices for quick and easy detection and tracking of superficially localized lymphedema and tissue fibrosis.
A12	BioCompression Systems www.biocompression.com 	Bio Compression Systems is the leading manufacturer of pneumatic compression devices for the treatment of lymphedema, venous insufficiency, wound care, arterial disease, DVT prophylaxis, post-op edema, and sports injuries. Our devices are available with a wide variety of garments including adjustable, custom, and over the shoulder. In addition to these products, we manufacture compression pumps, and garments for deep vein thrombosis prophylaxis and the BioCryo System providing cold and compression for acute sports injuries and post-op edema. The Bio Arterial Plus System is a pneumatic compression treatment for diabetic foot ulcers and ischemic disease of the lower extremities.
C04	LymphaTouch www.lymphatouch.com 	LymphaTouch Inc. is the Finnish medical device manufacturer behind the unique negative pressure LymphaTouch® treatment device. The device is designed to support lymphatic drainage. The negative pressure generated by the device helps improving lymphatic circulation in the treated area. In addition to negative pressure, LymphaTouch® has a mechanical high frequency vibration feature.
B24	Thonic Innvation www.fastngo.care 	Our patented hybrid technology Fast'n Go range has been developed to meet the needs of self-bandaging patients and homecare carers: simple, fast and safe application of a bandaging system with reproducible levels of compression and high stiffness. Founded in 2015, Thonic Innovation is, without any doubt, the smallest "global" company in the field of compression therapy and we are quite proud to say that Fast'n Go is currently distributed in France, Japan, Germany, Belgium, The Netherlands, Turkey, ... and we are looking for a distributor in North America. Come and see us at our booth (It will take you less than a minute to see an arm self-bandaged !). Thonic Innovation is an ISO 13485:2016 certified company.

Stand	Company	Description
A08/ A10	Thuasne www.thuasne.com 	Founded in 1847, THUASNE is a globally recognized creator, manufacturer and distributor of wearable medical devices, including braces, supports and medical garments. Thuasne has developed innovative lymphedema solutions, adapted to the different stages of this pathology. The MOBIDERM anti-edema device, supported by medical evidences, intends to improve the flow of lymphatic fluid and the drainage of the limb. MOBIDERM technology can be used within reducing bandages or incorporated into mobilising garments. Our recent innovative MOBIDERM AUTOFIT solutions provide easy to put on and comfortable garments, to optimise the long term control of lymphedema and to enhance patient's autonomy.
B28	Lymphedivas www.lymphedivas.com 	Lymphedivas is dedicated to providing medically advanced compression garments for men and women with lymphedema that will inspire them to feel strong and confident.
C10	Dr. Vodder School www.vodderschool.com 	The Dr. Vodder School and Academy are authorised by the Vodders to teach the original, unadulterated Dr. Vodder method of Manual Lymph Drainage. Our international training program is the worldwide MLD gold standard. Our training in MLD and Combined Decongestive Therapy has developed over the past 47 years and is taught in 22 countries in many languages. Many thousands of health care practitioners are certified in the treatment of lymphedema and related pathologies.

Exhibitor directory



Stand	Company	Description
A06	LR www.lohmann-rauscher.com  People.Health.Care.	Lohmann & Rauscher is your trusted partner in compression therapy and advanced wound care solutions. Lohmann & Rauscher has a 160-year history as a well-recognized and respected global manufacturer and supplier of compression therapy solutions and innovative wound care products. We are an industry leader in the treatment of lymphedema, chronic edema and venous edema by providing the most extensive line of compression therapy products; which includes Bandaging and the Solaris Collection of garments and wraps. L&R's comprehensive product portfolio of world-class brands such as Debrisoft®, Suprasorb®, Rosidal®, TributeNight™, and ReadyWrap™ are trusted for their effectiveness and quality. Visit www.lohmann-rauscher.com for more information.
A04	Luna Medical www.lunamedical.com 	Luna Medical, Inc. is a JCAHO accredited; durable medical equipment company solely dedicated to providing medical compression products nationwide. We have maintained family ownership for 25 years with our corporate headquarters located in the heart of Chicago. Our professional, friendly, personable and proficient team takes all the responsibility in advocating for insurance coverage for patients diagnosed with Lymphedema and Chronic Venous Disease. Luna is contracted In-Network with commercial insurance companies/networks nationwide, offers a Private Pay Match Program for patients paying out of pocket and can bill Health Savings/Flex Spending accounts. We function as the extension team to lymphedema treatment programs nationwide and most importantly, understand the physical, psychological and financial implications that Lymphedema and Venous Disease patients experience when dealing with home management. Patients need a system of support to take control of these chronic conditions. Luna Medical is here to meet the long-term needs of the Lymphedema Community.

B16 Persona

Stand	Company	Description
B02	Huntleigh www.huntleigh-diagnostics.com 	As a proud member of the Arjo family, we believe that great healthcare is always a collective effort. The greatest contribution we can provide to patients, and the professionals who care for them, is confidence. This is what we have been striving for since 1979, with innovative solutions in vascular care, fetal and patient monitoring. Solutions that can assist clinicians in improving outcomes and enhancing patient wellbeing. Whether it's the safe delivery of a new life, improving the day-to-day quality of life or monitoring life's vital signs, we aim for clinical excellence and improved performance, for life.
B26	Wear Ease www.wearease.com 	Wear Ease, Inc. designs products for recovery from surgery and related side effects of lymphedema, edema, and limited mobility. The leader in "ready to wear" therapeutic torso compression garments for lymphedema.
C06/ C08	AIROS Medical www.airosmedical.com 	AIROS™ Medical, Inc. is a medical technology manufacturer, designer, and specification developer specializing in compression therapy. Our team of engineers, regulatory experts, and clinical partners create medical devices that improve quality of life for patients battling lymphatic and venous disorders. Our product line includes the intuitive, easy-to-use AIROS 6 and AIROS 8 Sequential Compression Devices, as well as various-sized garments fitted to ensure effective upper and lower extremity therapy. We collaborate with physicians, therapists, and clinicians to drive high compliance of our proven, adjunctive, device-driven compression therapy allowing patients to life healthier, more mobile lives.

Exhibitor directory

Stand	Company	Description
B08	American Vein and Lymphatic Society www.veinandlymph.org	The American Vein & Lymphatic Society (AVLS), formerly the American College of Phlebology, is the largest association for physicians and allied health professionals concerned with the diagnosis and treatment of venous and lymphatic disorders, such as varicose and spider veins, venous ulcers and DVT. Comprised of about 2,000 members, the AVLS is a forum to exchange medical knowledge, best practices and the latest treatment options, as well as offering continuing live and online education and training aimed at improving the quality of patient care. For over 30 years, the AVLS has been an advocate for the advancement of vein and lymphatic care through education, resources and research.
		
BI2	East Coast Innovative Concepts www.ezyasabc.net	ECIC is focused on providing easy, inexpensive ways to overcome the challenge of donning and doffing compression stockings, arm sleeves, and tubular bandaging. Patients gain independence and are more likely to adhere to treatment advice when they can easily put on and take off their compression garments without assistance. Come by our table to try out the EZY-AS, Sock-eez, and our new EZY-Glove. See for yourself how much easier donning and doffing can be for your patients. Since our founding in 2010, our products have been embraced by health professionals in the world of lymphedema, phlebology, wound care, podiatry, orthopedics, prosthetics, and home care. Please visit our website at www.ezyasabc.net or contact us at 207-351-1487.
		
B06	Absolute Medical www.AbsoluteMedical.com	Absolute Medical, Inc. exists to provide support and guidance throughout the lymphedema management process. We are experts at fitting compression garments, working with insurance companies, and educating you on the best product for your needs.
		

Stand	Company	Description
BI8	Twinery www.twinery.co	MAS Holdings is South Asia's largest manufacturer of intimate wear and sportswear, counting over 30 years of experience working alongside leading apparel brands in the US and EU. As the source of innovation for MAS, Twinery combines knowledge of the human body with unparalleled expertise in fabrics and textiles to launch novel solutions that champion consumer needs. We specialize in next-to-skin technology manufacturing. Our latest launch SpryngMed (Portable active compression device) counts over 3 years of research among patients and medical experts and its patented compression pattern is designed to deliver circulation enhancement and relief that is effective and accessible.
		
B30	Limbo/Xpandasox www.limboproducts.com	The LimbO waterproof protector helps patients bathe and shower without getting dressings wet. Restores quality of life and avoids wet dressings and the risk of infection. LimbOs are 100% waterproof, easy to use, non-constrictive and available in a range of sizes. Bulk orders welcome. USA Tel: 1 866 348 4091
		
BI4	Lympha Technology www.lymphatechnology.com	LymphaTech has developed a novel 3D measuring system to enhance the standard of care for patients suffering from and at-risk of developing lymphedema and other swelling diseases. LymphaTech's easy-to-use mobile system standardizes the measurement process and reduces inter-operator variability by 75%, resulting in accurate volume and circumference measurements in less than 60 seconds.
		



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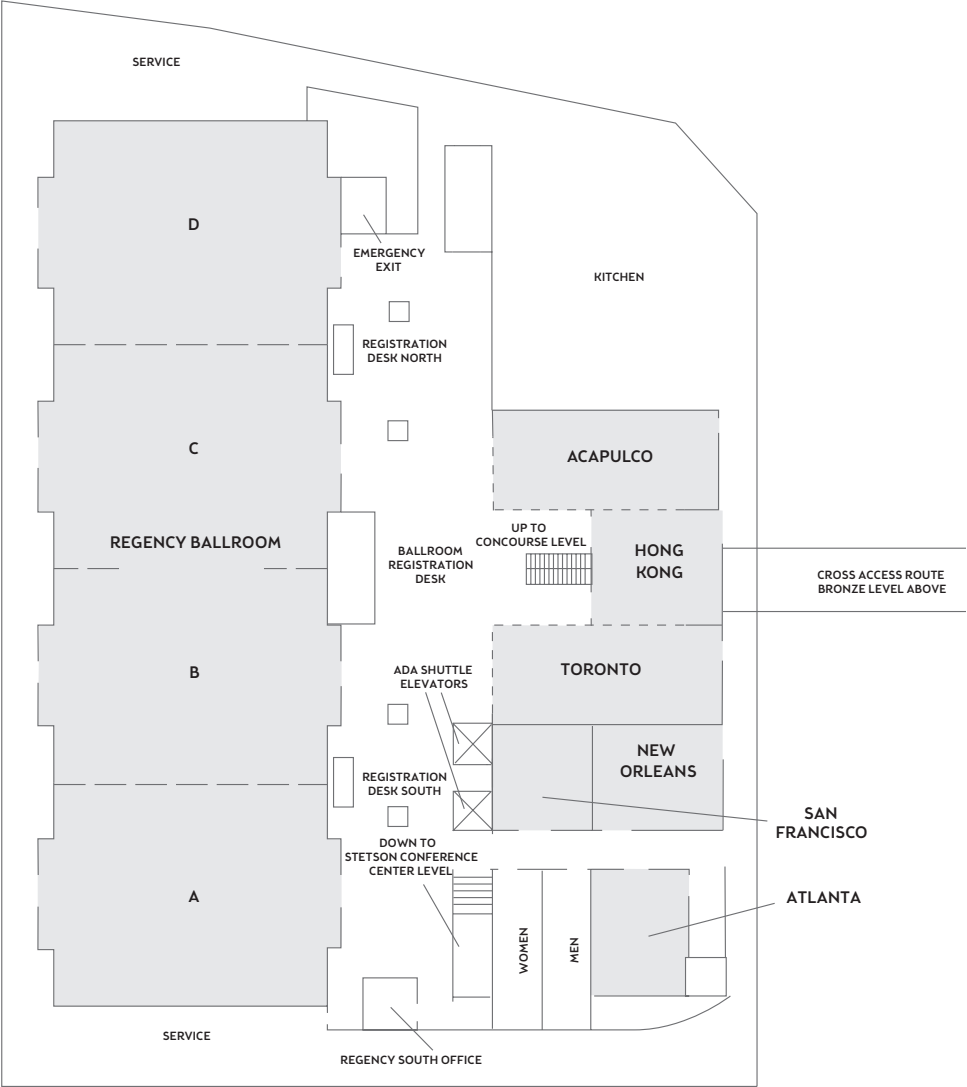
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Non profit exhibitors

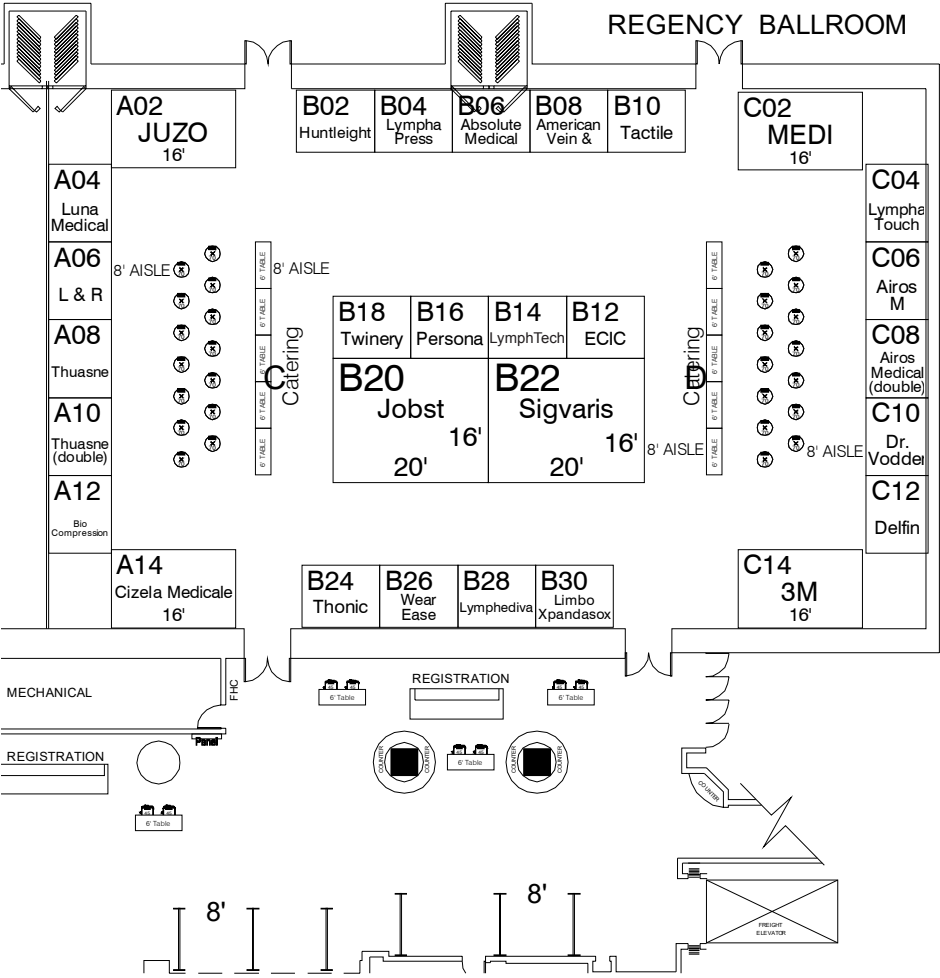


Ballroom Level (West Tower)



Exhibitors Floor Plan

REGENCY BALLROOM C/D



NONPROFIT EXHIBITORS	Regency Ballroom foyer
POSTERS	Hong Kong, San Francisco and Regency Ballroom foyer



Abstracts

[1] RELIABILITY OF CIRCUMFERENTIAL MEASUREMENTS FOR ASSESSMENT OF UPPER EXTREMITY LYMPHEDEMAYuanlu Sun¹, Jane Armer²¹ University of Missouri-St. Louis, College of Nursing, Columbia, United States² University of Missouri Sinclair School of Nursing, Sinclair School of Nursing, Columbia Mo, United States

Introduction: A valid and reliable measurement method to assess limb volume change is essential in lymphedema detection and management. Due to convenience and economy, circumferences of the affected and contralateral limbs are the most frequently-used method to detect and quantify lymphedema. However, circumferential assessment is often described as less reliable, as compared to other limb volume measurement approaches, such as water displacement and perometry.

Aim: The aim of this study was to examine the reliability of serial circumferential measurement using a flexible non-stretch tape measure and a rigorously-developed training protocol for assessing upper extremity volume change.

Method: Each of four well-trained limb volume assessors repeated circumferential measures on hands and at four centimeter increments from wrist to axilla three times on both unaffected arms of the same "healthy model". The measurements were conducted monthly. In the same year, the same assessors also performed repeated-circumferential measurements on 106 breast cancer survivors using the same protocol (three times during each visit). Measurement data of fifteen anatomic locations on each limb (thirty total locations on both limbs) were included in this data analysis. Software SAS 9.4 (2013) was used in conducting the analysis.

Results: The intraclass correlation coefficients (ICCs) were high among the four assessors in the measurement of the "healthy model" across the twelve months (ICCs: mean= 0.999, SD=0.000287). The variability of the three repeated measures were low on the healthy model across anatomic locations (SD_LSMEAN ranges from 0.028 to 0.177), based on the references from existing studies. The variability of the repeated measures was larger on the breast cancer survivors (Figure 2), compared to the repeated measures on the healthy model (Figure 1). The variability of repeated measures was not statistically different between anatomic locations of the limbs on the healthy model ($F=0.84$, $p=0.629$, $df=14$, 45) in the laboratory (Figure 3), but was significant on the actual breast cancer survivors ($F=10.36$, $p<0.0001$, $df=14$, 915) in the clinical settings (Figure 4).

Conclusions: Both inter-and intra-rater reliability of circumferential measurement can be acceptably high with well-trained assessors. The intra-rater reliability of the circumferential method may be somewhat diminished and the consistency of this method may vary by anatomic locations on the limbs when performed on actual patients. Emphasis on adequate training and regular assessment of intra- and inter-rater reliability is key.

[2] ASSESSING SEGMENTAL LIMB VOLUME CHANGES FOR EARLY DETECTION OF BREAST CANCER-RELATED LYMPHEDEMAKayla M. Daniel¹, Sacha Roberts¹, Tessa C. Gillespie¹, Cheryl Brunelle², Alphonse G. Taghian¹¹ Massachusetts General Hospital, Radiation Oncology, Boston MA, United States² Massachusetts General Hospital, Physical and Occupational Therapy, Boston MA, United States

Introduction: Breast cancer-related lymphedema (BCRL) affects approximately 20% of patients treated for breast cancer (BC), and prospective screening for BCRL has allowed for early detection. To improve effectiveness and timeliness of early detection, it is important to consider that arm volume changes may not be uniform.

Aim: To evaluate how segmental assessment of limb volume changes may improve detection of BCRL.

Method: We analyzed data from a cohort of women treated for BC who were prospectively screened for BCRL with a perometer and symptoms assessments pre-operatively and throughout follow-up. Limb volume changes were calculated using the relative volume change (RVC) formula. The final cohort includes 55 unilaterally-affected patients who experienced a maximum RVC 5-<10% and reported symptoms related to BCRL. Anatomical landmarks of each upper extremity were identified using preoperative perometer measurements, and RVC was calculated for five segments of the arm using the measurement at which the patient presented with RVC 5-<10%. The segments assessed include: hand to axilla, wrist to axilla, wrist to olecranon process (OP), OP to axilla, and the segment 10 centimeters distal to 10 centimeters proximal to the OP (OP±10 cm). Generalized estimating equations were applied to determine factors associated with developing RVC ≥10% in any segment.

Results: In this cohort, 34.5% (19/55) patients had at least one segment with an RVC ≥10% despite an overall RVC 5-<10%. Many of these patients experienced RVC ≥10% in the op-to-axilla segment ($n=14$), followed by the OP±10 cm segment ($n=5$) and the wrist-to-OP segment ($n=4$). Univariate analysis showed that predictors of having an RVC ≥10% in at least one segment were history of axillary lymph node dissection (ALND) (OR: 5.27, p -value: 0.011), and reporting at least five (4.36, p -value: 0.028) or six (OR: 7.76, p -value: 0.007) BCRL-associated symptoms. History of regional lymph node radiation (RLNR) was borderline significant (OR: 3.04, p -value: 0.069). On multivariate analysis, history of ALND with RLNR (OR: 6.24, p -value: 0.018) was a significant predictor of RVC ≥10% in at least one arm segment, and ALND without RLNR (OR: 7.20, p -value: 0.069) and having a BMI ≥30kg/m² at baseline (OR: 4.18, p -value: 0.076) were borderline significant.

Conclusions: Over 1/3 of patients had RVC ≥10% in one or more segments despite their overall RVC being 5-<10%. Therefore, assessing segmental limb volume changes may be effective in detecting BCRL early, especially considering that predictors of having RVC ≥10% in any segment include ALND, RLNR, and reporting BCRL-associated symptoms.

[3] ULTRASOUND - BETTER IN HAND THAN DISMISSED OUT OF HAND

W. Jungkunz¹, Janet Massey²

¹ Praxis Dr Jungkunz, Zwolle, Germany

² Concuria GmbH, Karben, Germany

Introduction: For lymphoedema, the ideal imaging tool should extend and confirm clinical judgement. It should be reliable, non-invasive, give reproducible results and not be expensive. It should certainly do no harm. Ultrasound diagnostic allows the consistency and elasticity of skin to be assessed, confirming the clinical initial diagnosis. Its use in follow-up provided a record which can be quantified.

Aim: This presentation will describe the German randomised controlled studies in primary lymphoedema which have confirmed the usefulness of the measurement of skin layer thicknesses assessed by serial 18MHz ultrasound probe readings.

Method: Based on his 35-year experience from hospital and his own out-patient practice, the author is able to review and quantify the effectiveness of ultrasound diagnosis and follow-up in patients with lymphoedema.

Results: The doppler ultrasound with an 18MHz head is an ideal teaching tool for staff, students, technicians and the patient. Serial readings over time are used to follow progression (such as decrease and increase in fibrosclerosis in the various skin layers) and, if needed, challenge the patient's statement that they have been wearing their compression garments.

Conclusions: All qualifying doctors now have had hands-on exposure to ultrasound in emergency, abdominal, obstetrics and gynaecological diagnosis. Physicians from India for example are really surprised that ultrasound is not used routinely in General Practice. It still may take time to convince dermatologists to use serial measurements of skin thicknesses for the diagnosis and follow up of compression therapy in lymphoedema. Lymphologists in Germany are moving towards this as a requirement for health insurer payment is introduced.

References

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2. Skin ultrasound for diagnosis and the evaluation of treatment of lymphoedema and lipoedema. Massey J, Jungkunz H W, Strubel G, Jungkunz L J BLS Annual Conference, Stafford October 2017

[4] COMPARISON OF DIELECTRIC AND L-DEX VALUES OF PATIENTS AFTER BREAST CANCER SURGERY: A PILOT STUDY

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Introduction: Breast cancer related lymphedema (BCRL) is a debilitating condition which can manifest after breast cancer surgery. Current reports indicated that 25-40% of breast cancer survivors suffer from BCRL as a main long-term complication. Since this condition is chronic, early detection and management of BCRL have been gaining attention in the last decade. Trend is choosing a safe and objective measurement tools in order to assess BCRL existence. In this regard, Tissue Dielectric Constant (TDC) measurement has been accepted as a safe and objective method to track changes locally due to directly related to tissue fluid. In addition, Bio Impedance Analyze (BIA) method is also accepted as a useful tool to assess BCRL only if it covers segmental measurement instead of whole-body measurement. Choosing the most appropriate method is crucial in both tracking early changes along with the follow ups.

Aim: To conduct a comparative pilot study regarding which method (TDC vs SOZO® BIA) would be more reliable to diagnose patients in which have already diagnosed whether they have BCRL or not.

Method: 12 female breast cancer survivors included in this pilot study. 8 cm proximal, 6 cm distal reference points from cubital fossa, 10 cm inferior point of the axilla were marked in both upper extremities prior to TDC measurements. 0.5, 1.5, 2.5- and 5.0-mm depth probes were used to measure dielectric values. Thereafter, women who were eligible for L-Dex measurements were measured with the SOZO® device.

Results: 12 breast cancer survivors (54±14.93year, BMI:29.81±5.15 kg/m²) four of them had been diagnosed with BCRL. 7 of 12 women were eligible to be measured in SOZO® BIA while all of them completed the TDC measurements. When compared to L-Dex and TDC values between patients with and without BCRL, all TDC values achieved four different depth probes were found significant except for "thorax" reference point (p<0.05, range 0.008-0.042). While in L-Dex measurements, there was also significant difference found (p=0.018).

Conclusions: It was found that both devices were in capable of to specify patients with and without BCRL, however, it still needs to be thoroughly studied regarding their cut-off points and other factors. Nevertheless, this is the pilot study which shows both devices are safe and reliable to detect changes in patients with BCRL along with follow up to detect BCRL in early settings.

[5] TISSUE DIELECTRIC MEASURES ON THE TRUNK IN WOMEN WITH AND WITHOUT TRUNK LYMPHEDEMA

Linda Koehler¹

¹ University of Minnesota, Rehabilitation Medicine, Minneapolis, United States

Introduction: Women are at risk of developing trunk lymphedema following breast cancer surgery. There are no standardized methods to quantify trunk lymphedema therefore clinicians rely on subjective assessment to diagnose trunk lymphedema. Tissue dielectric constant (TDC) values are quantifiable measures that may be able to quantify and help diagnose trunk lymphedema.

Aim: 1) Compare TDC trunk measures with subjective assessment for trunk lymphedema in women with and without trunk lymphedema following breast cancer surgery, and 2) Explore the potential utility of using TDC in the early detection of trunk lymphedema.

Method: This prospective longitudinal study observed women with and without trunk lymphedema following breast cancer surgery through 78 weeks. Trunk TDC measures were taken bilaterally on the lateral trunk at 2, 4, 12, and 78 weeks following surgery. Women were subjectively assessed for trunk lymphedema at 78 weeks by a lymphedema expert. The trunk TDC measures were compared to the subjective assessment through two sample Student's t-test and repeated measures analysis of variance.

Results: Trunk lymphedema was identified in 15 of the 32 women (47%) at 78 weeks through subjective assessment. Trunk TDC measures were statistically higher on the ipsilateral side compared to the contralateral side in women identified with trunk lymphedema at 78 weeks and all earlier visits. Women without trunk lymphedema had statistically higher trunk TDC measures on the ipsilateral side at 2 weeks but none of the subsequent visits.

Conclusions: This study demonstrates TDC is able to quantify post-surgical edema, trunk lymphedema, and potentially detect the early onset of lymphedema development following breast cancer surgery. The TDC method has potential utility as a diagnostic tool in clinical practice in adjunct to clinician experience and expertise in making lymphedema assessments and treatment decisions. Further research is needed to understand the full utility of the TDC method for diagnostic, predictive, and prescriptive use.

[6] EFFECTIVENESS AND DOSING OF EARLY CLT TREATMENT IN A SCREENING-BASED COHORT OF PATIENTS AT HIGH RISK OF BREAST CANCER-RELATED LYMPHEDEMA

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Introduction: Current guidelines recommend screening and early intervention for breast cancer-related lymphedema (BCRL); however, there is a lack of evidence surrounding ideal treatment threshold, parameters and dosing. During the reduction phase, complete decongestive therapy five times weekly is the standard recommendation, which is extremely burdensome to patients from a time and financial standpoint, and Certified Lymphedema Therapist (CLT) and clinical resources remain scarce. Efforts to clarify best practice treatment parameters and dosage resulting in improved patient outcomes are needed.

Aim: This study aims to report results of early diagnosis and treatment of BCRL from within a prospective BCRL screening program in order to identify treatment parameters and dosing and to make recommendations for further research supporting BCRL early diagnosis and intervention.

Method: This study is comprised of 32 patients treated for breast cancer at highest risk of BCRL (axillary lymph node dissection and regional lymph node radiation) referred to CLT with lymphedema 5-10% or >10%, with perometry measurements at beginning and end of the CLT episode. Successful outcome was defined as no progression of BCRL (relative volume change (RVC) or weight adjusted change (WAC)), and patients were stratified by progression vs. no progression. Kruskal-Wallis one-way analysis of variance was used to compare medians.

Results: Patient groups were not statistically different in terms of BMI or age at baseline ($p=0.41$, $p=0.93$ respectively), or immediate reconstruction. Of note, 18 of 32 patients had RVC/WAC of 5-15% at the beginning of treatment, with the remainder beginning treatment at >15%. Of the total cohort, 24 improved with CLT, with an average reduction in RVC/WAC of 7.9% (from beginning to end average RVC/WAC 16.8% to 8.9%). With treatment, 19 patients reached RVC/WAC of <10%, with 10 reaching <5%. Of the 24 patients who improved with treatment, 23 reached final reduction without MLD and multiple layer wrapping (i.e. with compression sleeve, exercise and education only), with a treatment frequency of 1.88 visits per month.

Conclusions: Screening for BCRL allows earlier diagnosis, and early treatment may allow for lower treatment dosing, whilst maintaining patient outcomes. This would decrease treatment burden for patients and improve efficiency of CLT resources. No change in practice is recommended at this time from this small study. However, this is hypothesis-generating, and a prospective cohort is recommended which integrate symptoms, clinical exam and objective measures to identify treatment parameters leading to best patient outcomes and resource allocation for patients with BCRL.

[7] POSITIVE OUTCOMES OBSERVED WITH THE INCORPORATION OF COMPRESSION BRA AND SPECIALIZED PAD TO ADDRESS SWELLING AND TISSUE FIBROSIS FOLLOWING TREATMENT FOR BREAST CANCER

Jacqueline Suzie Ehmann¹

¹ Atrium Health Stanly, Edema Management Program, Albemarle, United States

Introduction: Management of breast cancer related lymphedema has been primarily focused on treatment options to address arm and hand swelling with very little focus on breast or trunk swelling that can accompany treatment for breast cancer.¹ This is evident by the paucity of research focused on the incidence of lymphedema in this area as well as the lack of treatment options beyond generic mastectomy bras.¹⁻³

Aim: Observation study to objectively evaluate the impact of incorporation of a medical compression bra and a specialized pad to facilitate drainage of excess lymphatics into the treatment regimen during three phases (acute, sub-acute, chronic) of healing following surgery for breast cancer.

Method: 8 breast cancer survivors who presented with swelling and/or complaints of discomfort in the breast or chest wall referred to lymphedema therapist and fit with specialized compression bra and pad. Outcome data including self-report of pain and swelling, tissue dialectic constant (TDC) measurements, circumferential measurements, skin fold thickness and photographic progress were documented at regular intervals.

Results: Subjective improvement of symptoms of swelling and pain were observed in all patients. Other subjective reports included reduced stiffness in affected area, and reduced heaviness. Pain in the affected area was reduced by $\geq 50\%$. Reduction in tissue edema was observed in all patients. Changes in TDC were inconsistent between subjects except for those in the late phase of healing in which was observed steady decline in values.

Conclusions: There is benefit for the inclusion of a compression bra and specialized pad to address swelling in the breast and chest wall that is observed following treatment for breast cancer. Additional study is warranted to identify the optimal utilization as well as to better understand the pathophysiologic impact of the specialized pad under the compression bra.

[8] PROTOCOL OF A RANDOMISED CONTROLLED TRIAL REGARDING THE EFFECTIVENESS OF FLUOROSCOPY-GUIDED MANUAL LYMPH DRAINAGE FOR THE TREATMENT OF BREAST CANCER-RELATED LYMPHOEDEMA (EFFORT-BCRL TRIAL)

Tessa De Vrieze¹, Nick Gebruers², Ines Nevelsteen³, Sarah Thomis⁴, Wiebren A.A. Tjalma⁵, Patrick Neven³, Jean-Paul Belgrado⁶, Liesbeth Vandermeeren⁷, Nele Devogdt¹

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Introduction: Lymphoedema is a dreadful complication following breast cancer therapy. The consensus treatment for breast cancer-related lymphoedema (BCRL) is the decongestive lymphatic therapy. This is a two-phase treatment and combines different treatment modalities including skin care, manual lymphatic drainage (MLD), compression therapy and exercise. However, a meta-analysis, including 6 randomised controlled trials (Huang et al., 2013), and a Cochrane systematic review (Ezzo et al., 2015) have questioned the effectiveness of MLD. The meta-analysis showed an overall additional benefit of MLD to the treatment of BCRL of 75 ml, while the systematic review revealed that the individual contribution of MLD was limited to 7%. A possible explanation is that in previous studies MLD has been applied blind, without knowledge of patient-specific lymphatic routes of transport. In addition, the MLD hand manoeuvres used by the therapists in previous studies, possibly did not optimally stimulate lymphatic transport. Recently, near-infrared fluorescence imaging has been introduced to visualise the superficial lymphatic network which allows MLD at the most needed location.

Aim: The aim of the present study is to determine the effectiveness of the fluoroscopy-guided MLD, additional to the other parts of the decongestive lymphatic therapy and compared to the traditional or a placebo MLD, in the treatment of BCRL.

Study Design: A three-arm double-blinded randomised controlled trial will be conducted in different university hospitals in Belgium. Based on a sample size calculation, 201 participants with chronic BCRL stage 1 or 2 of the arm or hand, with at least 5% difference between both sides (corrected for hand dominance) need to be recruited. All participants receive the standard treatment: skin care, compression therapy and exercises. The intervention group additionally receives fluoroscopy-guided MLD. One control group additionally receives the traditional 'blind' MLD and a second control group receives a placebo MLD. All subjects receive 3 weeks of daily intensive treatments and 6 months of maintenance treatment. Follow-up period is 6 months. The primary outcomes are the reduction in lymphoedema volume of the arm/ hand and the change in stagnation of lymph fluid at level of the shoulder/ trunk.

[9] EXERCISE IN PATIENTS WITH CANCER-RELATED LYMPHEDEMA IN THE LOWER LIMBS. RESULTS FROM A FEASIBILITY TRIAL ON HIGH INTENSITY INTERVAL TRAINING (HIIT) WITH AND WITHOUT COMPRESSION GARMENTS

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³ Copenhagen University Hospital - Herlev and Gentofte Hospital, Department of Clinical Physiology and Nuclear Medicine, Herlev, Denmark

Introduction: Previously, clinicians have been reluctant to recommend vigorous physical activity to patients with lymphedema due to fear of exacerbating lymphedema. Thus, only few published studies have explored the safety and effect of exercise in patients with lower limb edema. Additionally, necessity of compression garments during exercise has not been clarified.

Aim: The purpose of the study was to investigate the feasibility of High Intensity Interval Training(HIIT) in participants with lower limb lymphedema.

Method: A feasibility trial with a cross-over design including 20 participants with lower limb lymphedema after cancer were carried out in a hospital setting, consisting of 2 sessions of HIIT on a stationary bike with and without compression garments with a 7 days washout period in between. Participants were randomized by open-ended randomization. Blinding was not possible.

Feasibility was assessed by recruitment rate, completion rate, acceptability and satisfaction with the intervention. In addition, changes in self-reported symptoms related to lymphedema were assessed on a numeric rank scale (NRS). Acute changes in the weight, volume and extracellular fluid in the lower limbs of each participant were monitored after each exercise session, assessed by Dual Energy X-ray Absorptiometry(DXA), circumferential measurements and Bio Impedance Spectroscopy(BIS).

Results: 60 % of the eligible participants were allocated to the trial and 19 participants with unilateral (n = 13) or bilateral lymphedema (n = 6) completed both exercise interventions. 1 participant withdrew before the second exercise session due to fever. No adverse events occurred during or after the trial. Participants were satisfied with both exercise sessions. No clinically relevant differences in change were found in lymphedema-related symptoms post-exercise or 24 hours after the exercise sessions. Additionally, differences in changes of weight, volume or extracellular fluid between the sessions were limited and not clinical relevant.

Conclusions: Recruitment to the trial and feasibility of the HIIT programme was excellent and the results indicated that it may be safe for people with lower limb lymphedema to engage in exercise of short duration but with high intensity with or without compression garments.

[10] DO WOMEN WITH LOWER-LIMB LYMPHEDEMA USE MORE ANKLE MUSCLE CO-CONTRACTION TO MAINTAIN BALANCE DURING QUIET STANDING?

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Introduction: Recent research has demonstrated that people with lymphedema experience a wide variety of sensory and motor symptoms which may produce detrimental effects on maintaining posture and balance.

Aim: The primary objective of this investigation was to establish whether weight distribution and muscular co-contraction are altered during a standing balance task, while secondary objectives included assessing ability to complete activities of daily living and fall risk in women with lower-limb lymphedema.

Method: Ten women (53.0 +/- 9.3 yrs) with either primary or secondary lower-limb lymphedema and ten controls (50.8 +/- 9.5 yrs) participated to this study. Testing consisted of a standing balance task where five, minute-long, trials were performed on a Matscan pressure mat with simultaneous bilateral measurement of muscular activity of the tibialis anterior and gastrocnemius medialis muscles using surface electrodes. Weight distribution was measured by analyzing the distribution of pressure underneath the feet obtained from the pressure mat while muscle activation was used to estimate co-contraction at the ankles. Additionally, the Human Activity Profile was used to assess ability to complete activities of daily living, and the Berg Balance Scale to assess fall risk.

Results: Significantly greater (p=0.05) ankle co-contraction was found in women with lower-limb lymphedema, with values in the lymphedema group close to two times those of controls (56.2% in affected limb and 60.8% in non-affected limb in the lymphedema group vs. 35.6% in dominant limb and 38.1% in nondominant limb in the control group). Compared to the control group, the lymphedema group had significantly lower scores relating to completing activities of daily living (p

Conclusions: Results from this investigation suggest that physical activity and ability to complete activities of daily living in women with lower-limb lymphedema are impaired while the effects of lymphedema lead to greater amounts of muscular co-contraction during quiet standing. Future research should focus on examining the effectiveness of specific interventions to improve physical activity in women with lower-limb lymphedema and continued investigation of muscular activation, co-contraction, and their subsequent impact on weight distribution in women with lower-limb lymphedema.

[11] PARENTING A CHILD WITH PRIMARY LYMPHEDEMA: A CONTINUUM OF PROTECTION

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Introduction: Parents of children with primary lymphedema (LE) have reported helplessness, frustration, and grief due to lack of support from medical professions with regard to diagnosis, lack of knowledge, and ineffective referrals to specialists. These struggles are exacerbated as children reach adolescence. In general, research has shown that parents of children with chronic conditions are at an increased risk for experiencing higher levels of stress and depression. Parents who experience excessive stress are more prone to negative mood, which has been shown to correlate with child behavioral problems. Family functioning in the context of parenting a child with a chronic condition can be impacted in the areas of communication, roles, and affective involvement. These parents may also be inclined to be overly protective of their children due to concerns about possible injury or exacerbation of their condition. Parents do not simply fall into the categories of being extremely overprotective versus more unguarded as some may fall in between. Factors that have been found to influence this continuum include parents' education level, gender of the child, and age of the parent.

Aim: To investigate the lived experiences of parents who have children that have been diagnosed with primary lymphedema.

Method: Data were collected using quantitative surveys and semi-structured interviews. These data were combined into "cases" for each child and parent. Qualitative data were coded using an a priori codebook. Codes were then subject to discussion by the research team who identified a pattern of parenting styles. Parents' approach to parenting fell along a continuum from 'Free Range Parents' (unguarded, relaxed, open) versus 'Bubble Wrap Parents' (overprotective, anxious, worried).

Results: Participants were 27 parents of children with primary LE who were primarily white, female, and highly educated. Participants were from six different countries with the majority originating from the United States. Free Range parents tended to be older and be more likely to have female children compared to Bubble Wrap parents. No patterns were identified relating to gender of parent, age of child, parents' education level, or country of origin. The anchors of this continuum of parenting will be presented with examples from interviews.

Conclusions: Parents of children with primary LE have a range of approaches to parenting their children. Implications for clinical practice and intervention with these parents and children will be discussed.

[12] MULTIFACTORIAL CHALLENGES TO ENGAGEMENT IN LYMPHOEDEMA MANAGEMENT: DISENGAGED PATIENTS' PERSPECTIVES FROM A METROPOLITAN HOSPITAL OUTPATIENT CLINIC IN AUSTRALIA

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Introduction: The optimal management of lymphedema often involves complex decongestive therapy where patients' engagement, adherence and motivation are pivotal factors in management success (Tzani, Tsihlaki, Zerva, Papathanasiou, & Dimakakos, 2018). Anecdotal, failure to engage in lymphedema management has more often been attributed to patient noncompliance rather than an understanding of other contributing factors or challenges faced by patients that can impact on management outcomes. There remains a paucity of studies that use a mixed methods approach to gain greater insight into the challenges faced by people with lower limb lymphedema. This is particularly the case for a traditionally hard to reach cohort: patients who are disengaged from a physiotherapy lymphedema program.

Aim: This pilot study aimed to explore participants' perceptions of a lower limb lymphedema management service program in order to improve engagement of current and future patients.

Method: A mixed method research design was adopted involving six participants who were purposively sampled from a fee-free metropolitan tertiary public hospital in Australia. Findings from semi structured interviews, resilience and quality of life instruments were triangulated and emerging results summarised.

Results: The age of the participants ranged between 51 and 72 years, and they presented with more than one decade of symptoms. All participants were obese and four (67%) had diabetes. Preliminary findings reveal that, over time, they reported a range of challenges/barriers impacting on their adherence to the program; these included physical, social and psychological barriers associated with their chronic condition. Physical barriers included access to the outpatient clinic. Social barriers included increased isolation within the home leading to growing dependency on family/other supports. Fear of falling was a key psychological barrier impacting upon their mobility and confidence. Two clear coping strategies emerged: first, disassociation, with study participants referring to 'the legs', as a disembodiment, limiting a more holistic management view. Second, a pronounced resignation about their condition, evident in a lack of motivation and reluctance to engage in or try different approaches to lymphedema management. Despite most participants being morbidly obese, body weight management was not raised by them within the interviews. Measures for greater program adherence and implications for further research are further outlined within the paper.

Conclusions: Findings of this pilot study presented a deeper understanding of the challenges associated with lower limb lymphedema; information that will facilitate the development of a more relevant and patient-centered lymphedema management service program in a clinical setting.

[13] LIVING WITH LEG LYMPHEDEMA: EXPLORING THE QUALITY OF LIFE AND DISEASE EDUCATION OF INDIVIDUALS EXPERIENCING CANCER-RELATED LEG LYMPHEDEMA

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Introduction: Lymphedema is a chronic condition characterized by regional bodily fluid accumulation of protein-rich interstitial fluid. A widespread cause of lymphedema is cancer-related therapy, which disturbs lymphatic integrity, resulting in swelling and inflammation. These symptoms are debilitating and burdensome, posing a substantial threat to patients' quality of life (QOL).

Aim: The purpose of this study is to evaluate the impact of lymphedema on the QOL of patients with cancer-related, lower-extremity lymphedema (LEL) and explore healthcare provider perspectives on LEL. The objectives are to: 1) assess patients' QOL and lymphedema knowledge; 2) evaluate the impact of previous and current management strategies; 3) assess patient interest in additional treatments, and 4) explore healthcare provider lymphedema knowledge, referral practices, and suggested interventions to improve care.

Methods: The design is mixed methods with qualitative and quantitative measures. Participants include two study populations: the Lymphedema Group, consisting of cancer-related LEL patients, and the Healthcare Provider Group, including physicians/nurses working within tumour groups at-risk for lymphedema. Self-report questionnaires and semi-structured interviews were used to triangulate perspectives from both groups. Purposive sampling was used to recruit participants for interviews.

Participants: Patients-Inclusion criteria included diagnosis with cancer-related LEL and residence within Alberta, Canada. Those experiencing cancer or undergoing active cancer treatment were excluded from the study.

Healthcare Providers-Physicians and nurses working within oncology services were included. Participants required the ability to refer/aid in the referral of patients to local lymphedema clinics.

Procedures: Patients completed a questionnaire focussing on QOL, anxiety, and depression. Interviews focussed upon QOL, social, physical and emotional aspects of lymphedema, diagnosis, treatment, and lymphedema knowledge/resource availability before and after cancer treatment. Healthcare providers completed an interview regarding referral practices, lymphedema-related knowledge/education, and strategies for improving care.

Results: Data from 13 participants have been collected. Means and standard deviations will be calculated for continuous variables and compared to published norms. Literature comparisons will also be used to evaluate levels of anxiety, depression, and QOL. Cross-comparisons between cancer types and sexes will be made using independent-samples T-tests. Inductive thematic analysis will be used for qualitative data.

Conclusion: Outcomes will be used to build a working theory, exploring the lymphedema experience and triangulating several factors that may impact QOL. If data demonstrate LEL impacts QOL, follow-up intervention studies could be implemented to improve care and education within community settings. Furthermore, if data reveal consistent strategies suggested by healthcare providers to improve LEL education and care, programs focused upon these strategies could be implemented.

[14] A QUALITATIVE STUDY OF THE EXPERIENCES OF WOMEN WITH LIPOEDEMA IN SCOTLANDAnne Williams¹, Isobel MacEwan²¹ Queen Margaret University, Edinburgh, Edinburgh, United Kingdom² Talk Lipoedema, Edinburgh, United Kingdom

Introduction: Lipoedema is a fat and connective tissue disorder associated with symmetrical proliferation of diet-resistant inflammatory fat tissue, mainly in the limbs and buttocks. Effective self-care is key to improving symptoms, and minimising lipoedema progression (Wounds UK 2017).

Evidence from online surveys has shown that living with lipoedema presents many challenges (Fetzer and Fetzer 2016). There has been limited exploration of the qualitative experiences of living with lipoedema, how women perceive and self-manage their condition, and what support is required.

Aim: To explore the perceptions and self-care experiences of Scottish women living with lipoedema of different stages.

To identify self-care outcomes and support strategies relevant to women with lipoedema.

Method: The study, informed by social constructionism, was undertaken in partnership with Talk Lipoedema, with recruitment via Talk Lipoedema social media. Ethical approval was obtained from the university ethics committee. Semi-structured interviews with women living with lipoedema were undertaken by an experienced researcher. A focus group was also convened to further explore the data from the interviews. Interviews and focus group were recorded and transcribed verbatim, and thematic analysis undertaken.

Results: A total of 24 women were interviewed, including those with lipoedema of: stage 1 (n=3); stage 2 (n=8); stage 3 (n=7); stage 4 (n=6). Eight women took part in the focus group, including seven of those already interviewed, and an additional woman (stage 1 lipoedema). Their ages ranged from 28 to 74 years and most had developed lipoedema around puberty. Key themes that will be presented include: the lipoedema trajectory/being different; the wasted years; emotional baggage/managing the spiral of self-loathing; 'you have lipoedema but there is nothing we can do for you'; trigger moments and crisis points; how much more do you want me to do?; sod you kind of attitude; family support; professional supported self-care after the diagnosis; strengths of peer support; those who went before and the future generations.

Conclusions: The findings further illuminate the devastating impact that lipoedema may have on women as they manage the demands of their family and working lives. Women predominately find support and information through third sector organisations. Professional NHS support services for women in Scotland are inequitable and inadequate, but the research findings provide directions for future developments.

Fetzer A, Fetzer S (2016) *Lipoedema UK Big Survey 2014 Research Report*.

Wounds UK (2017) Best Practice Guidelines for the Management of Lipoedema. London

[15] BREAST CANCER-RELATED LYMPHEDEMA AND QUALITY OF LIFE: A QUALITATIVE ANALYSIS OVER YEARS OF SURVIVORSHIPAllison Anbari¹, Ausanee Wanchai², Jane Armer¹¹ University of Missouri, Sinclair School of Nursing, Columbia, United States² Boromarajonani College of Nursing Buddhachinaraj, Research and Academic Services, Muang, Thailand

Introduction: Breast cancer remains the second most common cancer in the world. In the U.S., over 3.1 million breast cancer survivors are at life-time risk of developing breast cancer-related lymphedema (BCRL), with prevalence ranging from 6 to 48% (186,000-1.5 million). BCRL is often under-diagnosed and- treated, in part due to gaps in surveillance, measurement inconsistencies, and a lack of resources. BCRL presentation includes physiological symptoms such as arm swelling and range of motion limitations. Equally concerning are BCRL's psychological manifestations including distress, body image disturbances, and changes in role perception. Self-management of symptoms in BCRL is crucial, as there is currently no cure for the condition. Optimal treatment regimens require daily attention and are often viewed as burdensome.

Aim: The purpose of this qualitative study was to examine the perspectives of women newly diagnosed with breast cancer-related lymphedema (BCRL) regarding their quality of life (QOL) over seven years.

Method: Data were collected over seven years using the reliable and validated Lymphedema and Breast Cancer Questionnaire (LBCQ). Participants previously diagnosed with BCRL were prompted to answer two open-ended questions corresponding to BCRL-caused changes in mood and lifestyle from post-op through annual interviews and surveys. Self-reported data from 97 participants with BCRL were analyzed using in vivo coding and template-style content analysis to elicit the impact of BCRL on QOL domains.

Results: Data saturation was achieved as participants neared 30 to 36 months post-diagnosis. Three major themes were identified in the participants' narratives. A BCRL diagnosis has an impact on physical function that includes pain, fatigue, and being less active. Second, BCRL has an impact on daily living and social function where participants feel and become limited in their jobs and roles, while also expressing body image concerns. Finally, BCRL has an impact on psychological function that includes frustration, depression, and being more irritable.

Conclusions: Much has been written regarding the impact of BCRL on survivors' lives. However, our analysis and results are among the few to examine BCRL impact on QOL over seven years. Findings suggest that BCRL impacts QOL soon after diagnosis and throughout the early years of survivorship. Our findings support and promote the recommendation that additional interventions to sustain, maintain, and enhance current physical, social, and psychological function of women with BCRL should be designed and implemented proactively. Healthcare providers should develop appropriate programs to enhance QOL for breast cancer survivors with BCRL.

[16] RISK FACTORS ASSOCIATED WITH INCREASED FEAR OF BREAST CANCER-RELATED LYMPHEDEMA AND AVOIDANCE BEHAVIORS

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Introduction: Patients treated for breast cancer (BC) with axillary surgery or radiation remain at a lifelong risk for breast cancer-related lymphedema (BCRL). Studies have shown that BCRL negatively affects quality of life; accordingly, many patients fear developing BCRL and seek to minimize risk.

Aim: To identify factors associated with increased fear of BCRL and subsequent avoidance behaviors.

Method: 926 women treated for BC with unilateral surgery and 253 women treated with bilateral surgery were prospectively screened for BCRL with arm volume measurements and symptoms questionnaires to assess for BCRL (defined as a relative volume change {RVC} $\geq 10\%$). Fear scores and avoidance scores were calculated at each visit by averaging the response to questions assessing fear and avoidance taken from the Survey of Arm Care Following Breast Cancer. Univariate and multivariate analyses assessed for factors associated with fear and avoidance levels.

Results: 2,531 unilateral and 943 bilateral questionnaires were analyzed with a median of 2.7 and 3.7 surveys answered per patient respectively. Median time of survey completion was 18.6 months and 16.5 months after preoperative baseline. Patients who underwent bilateral surgery were more likely to demonstrate fear (OR: 2.07; $p < 0.001$) and avoidance (OR: 2.08; $p < 0.001$) than patients treated with unilateral surgery. For patients treated with unilateral surgery, post-operative (≤ 3 months post-surgery) fear was associated with greater baseline fear (OR: 8.58; $p = 0.001$), and postoperative avoidance was associated with greater preoperative avoidance (OR: 23.1; $p = 0.006$) and axillary lymph node dissection (ALND; OR: 5.61; $p < 0.001$). Patients who underwent unilateral surgery demonstrated greater fear at follow-up when they had demonstrated greater baseline fear (OR: 4.57; $p < 0.001$), had an ALND (OR: 1.86; $p < 0.028$) or regional lymph node radiation (RLNR; OR: 1.90; $p = 0.009$), or were younger than 55 at diagnosis (OR: 0.64; $p < 0.001$). Follow-up avoidance scores were associated with increased baseline avoidance (OR: 6.75; $p < 0.001$), having had an ALND instead of a sentinel lymph node biopsy (OR: 2.76; $p < 0.001$), having had an RVC of $5 < 10\%$ (OR: 1.63; $p = 0.009$), and being younger than 55 (OR: 0.69; $p = 0.041$). At follow-up, bilateral surgery patients demonstrated increased fear when they had increased baseline fear (OR 19.9; $p = 0.001$) and demonstrated increased avoidance when they had an ALND (OR: 1.58; $p = 0.004$) or a BMI $\geq 30 \text{ kg/m}^2$ (OR: 1.59; $p = 0.021$).

Conclusions: Patients demonstrate fear of BCRL and subsequent avoidance behaviors both postoperatively and after treatment. Practitioners should monitor patients for fear and avoidance levels preoperatively and maximize evidence-based education to mitigate patient fear and avoidance.

[17] COST-EFFECTIVENESS ANALYSIS OF PROSPECTIVE SURVEILLANCE VERSUS AN IMPAIRMENT-BASED MODEL OF CARE FOR BREAST CANCER-RELATED LYMPHEDEMA

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Introduction: Breast cancer-related lymphedema (BCRL) can negatively impact the quality-of-life of breast cancer survivors while causing significant financial toxicity for patients and society. The burden of BCRL is related to its severity and studies indicate that a prospective surveillance (PS) approach to early detection and intervention may reverse or prevent progression of early-stage BCRL compared to an impairment-based intervention (IBI) paradigm. Both PS and IBI are associated with different costs and quality-of-life implications.

Aim: Given budgetary constraints, cost-effectiveness analysis provides an analytical framework for policymakers to compare differences in costs and benefits among competing treatment alternatives thereby facilitating the optimal allocation of funds to cost-effective programs. We evaluated the cost-effectiveness of PS versus IBI for women with non-metastatic breast cancer.

Method: Using a decision tree with embedded Markov models a cost-utility analysis was performed comparing strategies of PS versus IBI for patient cohorts status-post axillary lymph node dissection (ALND) or sentinel lymph node biopsy (SLNB) plus or minus adjuvant radiotherapy. The base case time horizon was 60 months; consistent with the maximum follow-up reported for the Massachusetts General Hospital (MGH) PS program. The effect of a lifetime horizon was studied in scenario analyses. Patients entered the model in the "Alive Without Lymphedema" health state and transitioned among health states of "Alive With Clinical Lymphedema," defined as $\geq 10\%$ increase in relative volume change (RVC)/weight-adjusted change (WAC), "Alive With Complicated Lymphedema," "Alive After Regression to $< 10\%$ RVC/WAC" or "Dead," based on probabilities derived from the medical literature and the MGH experience. The base case analysis employed the combined BCRL incidence for all treatment groups derived from the MGH data. Costs were from a societal perspective and health state utilities were obtained via the EuroQoL-5D instrument and standard gamble/time-trade-off techniques. Incremental cost-effectiveness ratios (ICER) were calculated per quality-adjusted life year (QALY) using a 3% discount rate. Sensitivity analyses addressed uncertainty in key variables.

Results: In the base case analysis PS resulted in incremental costs of \$882 and a gain of 0.33 QALYs, yielding an ICER of \$2,640/QALY. Sensitivity analysis revealed the cost-effectiveness of PS to remain robust to changes in all key variables.

Conclusions: A policy of PS is cost-effective compared to IBI using common willingness-to-pay thresholds, with a base case ICER below that of many breast cancer-related health care interventions. PS becomes increasingly cost-effective in cohorts at higher risk to develop clinical BCRL and when studied over a lifetime.

[18] LYMPHOEDEMA AFTER BREAST CANCER TREATMENT - PRIMARY PREVENTIVE PROTOCOL: FIVE YEARS FOLLOW-UPMarina Cestari¹¹ O.U. Territorial Rehabilitation NHS Umbria2, Terni, Italy

Introduction: In the laboratory of lymphology the decision was taken to focus the attention on patients who have undergone breast cancer surgery which included patients at risk of developing lymph stasis in the homolateral arm.

Aim: Five years ago the author planned a preventive protocol in order to avoid lymphoedema onset in patients who have undergone breast cancer surgery and after five-year follow-up, the conclusions have been drawn.

Method: The protocol which was carried out on 143 patients, consisted of three steps: Step 1. Lymphologist and physiotherapist joint assessment of patients which included a clinical evaluation, a centimetric-volumetric measurement of compared arms, an ultrasound assessment to evaluate the sub-cutaneous tissue, shoulder functionality evaluation through abbreviate Costant-Murley shoulder score, the request for lymphoscintigraphy exam.

Step 2. The opening of a rehabilitative project and the inclusion of patients in four different directions:

- Individual Shoulder Rehabilitation Treatment which included patients with limited shoulder functionality,
- Individual Treatment of complications onset after breast cancer surgery and/or radiotherapy.
- Individual Lymphology Sitting which included patients with initial dermal back-flow, highlighted through lymphoscintigraphy exam.

Step 3. It included all patients who had or not had undergone individual treatments and consisted in two phases:

- a. Informative Group: consisted of simple information about lymphoedema and preventive measures. This included informal conversation with patients and active listening to patients' problems,
- b. Physical Activity Group: consisted of respiratory training, stretching exercises, gymnastic exercises, relaxation techniques, improving awareness through movement based upon Feldenkrais Method.

The follow-up was required for all patients.

Results: In the first 2 years, lymphoedema onset in 4 patients during the 1st year was noted (the patient came out of follow-up after oedema onset) and 7 patients of 139 remaining during the 2nd year (the patient came out of follow-up after oedema onset).

At the end of the 2nd year, 34 patients without oedema, decided not to continue the follow-up; the lymphologist asked them to contact the service immediately after oedema onset, but none of them called during the following 3 years. During the remaining 3 years, no lymphoedema onset was noted in the remaining patients until the end of the follow-up.

Conclusions: Lymphoedema is a physical, psychological and social disease, and with this awareness, the author planned a preventive protocol which highlighted its usefulness in order to prevent lymphoedema onset (oedema onset: 11 patients out of 143) and the physical-psychological well-being achieved through the early and holistic care.

[19] PREVENTION AND EDUCATION THROUGH HEALTHY LEG CLINICS IN PRIMARY CAREPippa McCabe¹¹ South Eastern Health and Social Care Trust, Lymphoedema Service, Lisburn, United Kingdom

Introduction: In 2009 an overhaul of Lymphoedema Services in Northern Ireland to provide dedicated lymphoedema services to both cancer and non-cancer related lymphoedema patients took place across the province. In the past 10 years the landscape of chronic oedema, lymphoedema and lipoedema has broadened significantly; demand for services has far exceeded capacity. This coupled with reduced management of chronic oedema in primary care, lead to inappropriate referrals into lymphoedema and tissue viability services. This project aimed to scope and rectify these problems with the development of healthy leg clinics based in general practitioners (GP) practices.

Aim: Estimate the number of simple chronic oedema patients requiring management

- Develop and implement a pathway for these patients, skilling up GP staff and pharmacists
- Reduce inappropriate referrals to tissue viability and lymphoedema services
- Prevent costly conditions eg. cellulitis, leg ulcers and lymphoedema
- Reduce prescribing of inappropriate hosiery, diuretics and antibiotics

Method: An initial scoping project was undertaken to review GP coding for patients presenting with leg oedema, develop a pathway and patient information leaflets, and gather staff and patient opinions on management of leg oedema.

Results from this were developed into a funding proposal to establish healthy leg clinics in GP practices supported by a chronic oedema liaison therapist.

Results: The project has now been running for 10 months and 19 practices are involved. In the first 8 practices 53 GP's, pharmacists and practice nurses were trained, and 35 clinics booked.

For the first 22 patients seen in the pilot study prescribing savings of £597 per year were calculated through the correct prescribing of hosiery.

Furosemide had been commenced in 6/22 of the patients identified. De-prescribing potentially reduced adverse effects of long term diuretic use.

A life impact scale was used to capture patient outcomes, 70% patients were "very pleased with the service", reporting the best aspect as the opportunity to get information on how to help their condition. All patients found the negative impact of their swelling was reduced as a result of the care received.

Conclusions: This project has demonstrated benefits in patient and staff education/awareness, prescribing savings, appropriate de-prescribing and patient satisfaction. Measurement of long range data (reduction in referrals to secondary care, and prevention of complex conditions) have not been possible to achieve within the project time frame, however, early management and increased patient/clinician understanding of the condition would suggest that this is achievable.

[20] THE DEVELOPEMENT OF KEY PERFORMANCE INDICATORS USING THE DELPHI TECHNIQUE FOR A REGIONAL LYMPHOEDEMA SERVICE IN IRELAND.Meadbh McSweeney¹¹ Tlc The Lymph Clinic, Cork, Ireland

Introduction: A Classic Delphi Technique was used to develop Key Performance Indicators (KPIs), relevant to the HSE Mid-Western Lymphoedema Service at University Hospital Limerick. This specialist Lymphoedema Service provides care to patients from the symptomatic breast cancer services and other services.

Aim: To develop relevant KPIs as an essential tool for an LE service and as a means of quantitatively measuring quality for service improvement and future service delivery. The KPIs centred around equity of access to the service; efficiency, patient education and evidence of effectiveness of service delivery.

Method: : A classic two round Delphi Technique was used to achieve consensus among lymphoedema specialists and service referees working nationally and internationally. This included feedback from an Expert Panel of national and international clinical leads. The KPIs consultation process used a Balanced Scorecard™ as prescribed by Kaplan and Norton. An 80% consensus of 'important' or 'very important' was used as the acceptable cut off and deciding factor for study iterations. Every effort was made to ensure the KPIs are easy to understand, objective, reliable, quantifiable and relevant to patient outcomes.

Results: The Delphi Panel response rate was 93.33%. Following Expert Panel feedback, more than 80% (96.3%-100%) of Delphi Panellists agreed on a Suite of 7 proposed KPIs allowing the KPIs to be accepted.

Conclusions: This is the first Irish study to identify KPIs for lymphoedema services. The Suite of 7 KPIs will play an important part for setting standards and will prove invaluable for the quality of care in Lymphoedema Services.

[21] THE EFFECT OF EARLY INTERVENTION ON EARLY STAGE OF BREAST CANCER-RELATED LYPHEDEMAQian Lu¹, Mei Fu², Fenglian Li¹, Quan Ping Zhao³, Ying Cui³¹ Peking University, School of Nursing, Beijing, China² New York University, Nyu Rory Meyers College of Nursing, New York, United States³ Peking University People's Hospital, Department of Breast Surgery, Beijing, China

Introduction: Breast cancer-related lymphedema (BCRL) is the most common and distressing complication among breast cancer survivors, which remains a challenge globally and continues to be a lifelong, irreversible, and incurable complication with negative physical, psychological, and emotional effects for patients. Early intervention is significantly important.

Aim: To pilot test the effect of the The-Optimal-Lymph-Flow (TOLF) program, an educational and behavioral intervention focusing self-management to promote lymph flow on early stage of BCRL among Chinese women treated for breast cancer.

Method: We screened 430 patients treated for breast cancer at a larger metropolitan tertiary hospital northern China from April 2017 to June 2018. Early stage of BCRL was defined as limb volume difference > 1cm using circumference measurements. Among 430 patients screened, 249 patients were identified with early stage BCRL and 66 agreed to participate in the intervention. TOLF program was delivered by a nurse during a face-to-face session, patients were followed up at 1, 3, 6 and 12 months after intervention. Intervention outcomes included lymphedema related behaviors, symptoms measured, and limb volume. Generalized estimating equations were used to estimate the effects of the intervention on outcomes variables.

Results: There was statistically significant difference in the scores of lymphedema related behaviors among the 5 test points (23.35±2.959, 28.14±2.320, 28.71±1.904, 28.77±1.787, 28.62±1.794) (P<0.001) and the β value of each follow-up point was 4.788(P<0.001), 5.364(P<0.001), 5.424(P<0.001) and 5.183(P<0.001), respectively.

There was statistically significant difference in the number of lymphedema symptoms among the 5 test points (9.64±4.067, 9.24±4.039, 8.76±3.977, 8.48±4.096, 8.60±4.323) (P<0.001) and the β value of each follow-up point was -0.394 (P=0.001), -0.879 (P<0.001), -1.152 (P<0.001) and -1.511 (P<0.001), respectively.

There was statistically significant difference in the scores of lymphedema symptom distress among the 5 test points (18.97±13.876, 16.52±12.250, 15.20±11.638, 13.98±11.157, 14.31±12.246) (P<0.001) and the β value of each follow-up point was -2.455 (P<0.001), -3.773 (P<0.001), -4.985 (P<0.001) and -4.165 (P<0.001), respectively.

There was statistically significant difference in the volume difference among the 5 test points [295.24±325.189, 252.98±271.881, 223.31±228.029, 217.96±228.318, 260.63±257.476 (ml)] (P=0.001) and the β value of each follow-up point was -42.257 (P<0.001), -71.931 (P<0.001), -77.281 (P<0.001) and -58.592 (P=0.001).

Conclusions: The-Optimal-Lymph-Flow program was effective to manage early stage BCRL to achieve beneficial effects on increasing behaviors to promote lymph flow, and reducing the occurrence of risk behaviors, alleviating lymphedema symptoms and symptom distress as well as optimizing limb volume changes.

[22] INTERVAL REGIMEN AFFORDS INCREASED PATIENT CONCORDANCE AND COMPLIANCE FOR OPTIMAL OEDEMA MANAGEMENT SYSTEMKaren Bock¹, Jacqueline Suzie Ehmann²¹ Truman Medical Center Hospital Hill, Kansas City, United States² Atrium Health Stanly, Edema Management Program, Albemarle, United States

Introduction: The diversity of presentations and patient co-morbidities make the “one-size-fit all” a less than optimal treatment approach when it comes to the long-term management of lymphedema. More recent work has demonstrated an “interval” regimen may be a more practical approach. Providing the patient with options for compression devices and/or ability to adjust the compression level to address clinical presentation is hypothesized to optimize the success of oedema management. The options allow the patient to create an “interval” self-care compression regimen that may change hourly, daily or weekly depending on clinical presentation. As randomized controlled trials are not a viable when comparing treatment options in the management of lymphedema, research in the form of case series and observational study have been shown to be valuable evidence to determine treatment efficacy.^{1,2} (Piller 2018, Frieden 2017)

Aim: The aim of this study is to report the authors’ observational studies, case reports and patient feedback using validated tools to demonstrate how providing compression options can be used to create an optimal “interval” regimen to optimize not only edema management, but also concordance and compliance to a compression regimen.

Method: 22 patients referred to two separate oedema management were evaluated and treated with modified complete decongestive therapy. As part of a long-term oedema management regimen the patients were issued multiple compression products (Velcro adjustable wrap, flat knit garments, night-time garments) and instructed with use /care. Outcome data including limb volume, tissue fibrosis (utilizing a tonometer), range of motion, functional activity status assessed via the Timed Get Up and Go (TUG)³ or four-meter walk test, and quality of life (QOL) assessed utilizing the Lymphedema QOL⁴ questionnaire. Outcome data was recorded at regular intervals including upon initial evaluation, at the time of fitting and following a period of self-management.

Results: Over 50% of patients had additional volume loss while performing their own “interval” regimen, using multiple compression options. Two patients had slight increase in volume. QOL scores and functional activity levels were maintained or improved in all patients. Preliminary data indicates over 10% reduction in fibrotic tissue in 2 out of 4 patients using chipped foam garments, mostly for evening use.

Conclusions: Optimal management of lymphedema requires focus on not only volume containment but also on tissue texture and patients’ lifestyle. These results indicate that with multiple treatment options patients have enhanced compliance and concordance using an “interval” regimen. One size does not fit all.

[23] THE ONLY WAY FOR TREATING LYMPHEDEMA IS MULTI DISCIPLINARY APPROACHTim Decock¹¹ Dr Vodderschool B/N, Willebroek, Belgium

Introduction: The main cause of lymphedema is widely assumed to be treatment for cancer. Indeed, prevalences of 12-60% have been reported in breast cancer patients and of 28-47% in patients treated for gynaecological cancer. However, it appears that about a quarter to a half of affected patients suffer from other forms of lymphedema, eg primary lymphedema and lymphoedema associated with poor venous function, trauma, limb dependency or cardiac disease (BP ILF 2006). Although lymphedema is not a life-threatening disorder, it is a chronic condition that can create considerable disability with recurrent infections in the limb, functional impairment and pain. In addition, research has demonstrated significant psychosocial morbidity, and poorer quality of life in breast cancer survivors who develop lymphedema (McNeely 2004). It may be greatly ameliorated by appropriate management, many patients receive inadequate treatment, are unaware that treatment is available or do not know where to seek help (Best Practice ILF 2006). Treatment should comprise a holistic and multidisciplinary approach that encompasses all aspects such as assessment by a trained lymphedema specialist, exercises tailored to the patient needs, mld, compression therapy and skin care.

Aim: In Belgium proper reimbursement for lymphedema patients is lacking to provide all aspects necessary for the appropriate treatment in an efficient way. As teachers of Vodderschool B/N we implemented and trained our students in a care pathway to provide efficient care in current economic constraints. As Head Physio of two private lymphedema-clinics and teacher lymphology I see the best results while working together.

Method: Our Care Pathway for community patient consists of:

Phase 0: Diagnosing by the physician (lymphoscintigraphy, fluoroscopy,...)

Phase 1: by Physical therapist

1. Measurements of current situation and frequent measurement
2. Manual lymphdrainage
3. Bandaging with a 2 Layer Cohesive Compression System
4. Exercises to stimulate the venous and lymphatic flow return

Phase 2: by a trained bandagist provider:

1. Measurement of flat knitted stocking
2. Physical therapist during the time of fabrication of the stocking provides weekly MLD and compression sessions to maintain volume reduction

Phase 3: After wearing the stocking for a few weeks, check-up by the physician.

Results: Results from various cases show that a Lymphoedema Care Pathway for the community setting can have good patient outcomes despite the lack of proper reimbursement for lymphedema patients.

Conclusions: Treating lymphedema have the best outcomes when we work together as specialists in our own discipline!

[24] EFFECTIVENESS OF A COMBINED APPROACH OF TEAM WORK IN A COMPLEX CASE OF LOCALIZED MULTIPLE ELEPHANTIASIS

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Introduction: In daily practice, complex patients affected with lymphoedema, with associated co-morbidities, are frequently examined and they require expanded team work in order to obtain an optimal result and a consequent better quality of life.

Aim: Authors' purpose was to obtain an optimal therapeutic result of complex case within extended team work

Method: The evaluated clinical case is a 35-year-old obese man (150 kg), who had already undergone bariatric surgery, suffering from massive inguino-scrotal elephantiasis, with dermato-lympanic-adenitic sequelae, respiratory failure, hepatic steatosis, depressive syndrome and severe functional limitation.

The surgeon, after the clinical evaluation and the required diagnostic tests (CT abdomen-MRI of the lower abdomen and crustal / genital-lymphoscintigraphy of the lower limbs), in anticipation of an intervention to remove the bulky mass at the root of the left thigh, sent the patient to the attention of a rehabilitative lymphological team for the volumetric reduction of the same.

After a clinical lymphological evaluation, the rehabilitation team carried out the first physiotherapy cycle (special maneuvers for fibrosis, skin care, multi-layer bandage) on the voluminous elephantiasis mass located at the root of the left thigh, performed in 5 sessions, twice per day.

After the short physiotherapy course, the surgeon has removed the residual mass.

After post-intervention healing resolution, the patient underwent a new physiotherapy cycle ((special maneuvers for fibrosis, skin care, multi-layer bandage) for the contralateral and scrotal mass reduction, at the end of which (5 sessions twice per day) surgical removal of residual masses followed.

Results: At the end of the first cycle of physiotherapy of the left elephantiasis mass, a circumference reduction was obtained at the widest point of 76 cm, while at the end of the second cycle the circumference of the right mass decreased by 45 cm and the scrotal mass by 55 cm.

The patient completed his physiotherapeutic and surgical therapeutic course within 6 months and the result obtained was stabilized with a tailored flat texture tights.

The patient he started to walk, to drive, to wash himself, to lose weight and improve his psychological state.

Conclusions: In daily practice, complex patients are often referred to the rehabilitation lymphological team, which requires expanded team work in order to obtain an optimal result with a consequent improvement in the quality of life.

[25] NORMATIVE DATA OF BREAST TISSUE DIELECTRIC CONSTANT (TDC) USING THE LYMPHSCANNER

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Introduction: Tissue Dielectric Constant(TDC) is a method to measure tissue water. It is being increasingly used to confirm the presence of lymphoedema not only to the limbs but also of the trunk and head and neck (Mayrovitz and Weingrad, 2018). As a new diagnostic tool, there is minimum data as to the normal values of TDC for normal breast tissue. Having this normative data will allow for us to understand the abnormal values for breast oedema. Normal Tissue water for limbs has been cited as 25-45% (Lahtinen, 2015) with breast oedema ratio being uses as 1:4, higher than limb TDC at 1.2 (Johannsson, 2014).

Aim: The aim of this study was to ascertain the normative data for breast tissue to allow better diagnosis in the pathological breast. This may lead to differing treatments and improved outcomes through early intervention.

Method: Data was collected from 200 breasts, classified in the normal population. Consent was gained and data collection included age, BMI, Height, weight, breast/bra size, Medication, temperature and menstrual status. The process consisted of removal of the bra for 5 minutes to regulate body temperature whilst questions were asked. The TDC measurement were taken in each of the four quadrant of the breast, with the participant in the sitting position. Where possible, all measurement were taken in the morning.

Results: Data collection at present is ongoing but 50% complete. At this point we cannot discuss predict the final outcomes or the variables.

Conclusions: As new diagnostic tools are introduced to main practice it is important that we understand the norms of different body parts and variables when assessing. This will allow for the better assessment of patients, recognition of variables in using this tool and the implementation of differing treatment programmes as appropriate.

[26] RELIABILITY OF THE MOISTUREMETER D COMPACT DEVICE AND THE PITTING TEST TO DETERMINE LOCAL TISSUE WATER IN SUBJECTS WITH BREAST CANCER-RELATED LYMPHOEDEMA

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Introduction: Local tissue water (LTW) in patients with breast cancer-related lymphedema (BCRL) can be assessed by measurement of the tissue dielectric constant using the MoisturemeterD compact (MMDC) device, or by performing the pitting test. Although these assessment methods are commonly used in clinical practice, literature shows a lack of research on their clinimetric properties.

Aim: The aim of this study was to investigate reliability of both methods, in assessing the upper limb in BCRL.

Method: Thirty women with BCRL were enrolled. LTW was evaluated at 9 reference points on the upper limb and trunk, using both methods. To determine intra- and inter-rater reliability of the MMDC device (using absolute PWC% values and inter-arm PWC% ratios based on single and multiple measures), intraclass correlation coefficients (ICCs), standard errors of the measurement (SEMs) and systematic changes between the means were calculated. To determine intra- and inter rater agreement of the pitting test, Cohen's Kappa coefficients were calculated as well as percentages of agreement.

Results: MMDC measurements yielded moderate to very strong intra- (ICC 0.606-0.947) and inter-rater (ICC 0.606-0.941) reliability, depending on the measurement location on the edematous limb. The pitting test showed a very strong intra-rater agreement at mostly all defined points, but a weak inter-rater agreement, especially at the medial elbow and the breast.

Conclusions: This study supports the MMDC device and pitting test as being useful tools in the clinical evaluation of BCRL over time. However, further research into the concurrent validity of both tools is warranted.

[27] WHAT IS THE BEST METHOD TO DETERMINE EXCESSIVE ARM VOLUME IN PATIENTS WITH BREAST CANCER-RELATED LYMPHOEDEMA IN CLINICAL PRACTICE? RELIABILITY, TIME-EFFICIENCY AND CLINICAL FEASIBILITY OF FIVE DIFFERENT METHODS

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Introduction: As a result of enhanced early detection techniques and improved loco-regional as well as systemic treatment protocols, the amount of cancer survivors nowadays is expanding. (Parry et al., 2011). However, more than 16% of the women treated for breast cancer develops lymphoedema of the arm (DiSipio et al., 2013), with surgical and/or radiation therapy being the most common cause. (Poage et al., 2008) Although health care practitioners can apply various conservative treatment modalities to reduce the amount of breast cancer-related lymphoedema (BCRL), the evaluation of the treatment effect is not possible without an accurate, valid and reliable method to determine arm size. In clinical practice, it is crucial that this measurement tool is easy-to-use and rapid as well. (Megens et al., 2001)

Aim: To investigate the reliability, time-efficiency and clinical feasibility of five commonly used methods for assessing excessive arm volume in patients with BCRL.

Methods: Excessive arm volume was determined in 30 participants with unilateral BCRL by five different methods: traditional volumetry with overflow, volumetry without overflow, inverse volumetry, opto-electronic volumetry and calculated volume based on circumference measurements. To investigate intra- and inter-rater reliability, measurements were performed twice by the same assessor and once by a different assessor. Intraclass correlation coefficients (ICCs), standard errors of the measurement (SEMs) and systematic changes between the means were calculated. To determine time-efficiency, the mean set-up time, execution time and total time were examined for each method. Furthermore, eleven limitations regarding clinical feasibility were listed and scored for each method. Finally, an overall ranking score was determined between the methods.

Results: Mean age was 65 (±8) years, mean body mass index was 28 (±4) kg/m². Intra- and inter-rater reliability ranged between strong and very strong. Calculated arm volume based on circumferences showed the highest intra- and inter rater ICCs of .987 and .984, respectively. Opto-electronic volumetry was the fastest method, representing a mean total time of 1 minute and 43 seconds for performing a bilateral measurement. The least limitations were reported on the calculated volume based on circumferences method.

Conclusions: Calculated volume based on arm circumferences is the best measurement method for evaluating excessive arm volume over time in terms of reliability, low error rate, low cost, few limitations, and time spent.

[28] BONE LOSS IN THE AFFECTED FOREARM PATIENTS WITH BREAST CANCER-RELATED LYMPHEDEMA: A CONTROLLED STUDY

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Introduction: Due to earlier diagnosis and developments in treatment, breast cancer is no longer considered to be a life-threatening condition; rather, it is a chronic condition in which health care professionals are able to manage the long-term complications, such as lymphedema and osteoporosis.

Aim: We aimed to investigate the association between lymphedema and bone mass density (BMD) of affected and unaffected forearms in patients with breast cancer-related lymphedema (BCRL). We also explored whether there was a relationship between any disability and BMD on the affected side.

Method: We evaluated 111 patients (53.75±9.07) with unilateral lymphedema (Group 1) and 61 patients (50.90±12.44) without lymphedema (Group 2) after breast cancer surgery. BMD was performed by dual-energy x-ray absorptiometry (DXA) in lumbar spine, femoral neck, and distal forearm on both sides. Functional situation was assessed by the Disabilities of the Arm, Shoulder and Hand (Quick-DASH) questionnaire.

Results: The total Z score (p=0.018), T score (p=0.005), and BMD value (p=0.014) were lower in the affected forearm than the unaffected forearm in Group 1. There was no difference between the affected or unaffected sides in the total Z-score (p=0.394), T-score (p=0.518), and BMD value (p=0.629) in Group 2. The DXA measurements in terms of the total forearm Z, T scores, and BMD value on the affected side were statistically significantly different between the groups. There was no difference between groups in the femur neck and lumbar total Z and T scores. There was also a positive correlation between the Quick-DASH scores and lymphedema stage (r=0.469, p=0.001), and the duration without treatment of lymphedema (r=0.298, p=0.02) in Group 1.

Conclusions: We recommend early diagnosis and treatment of lymphedema for the protection of upper extremity disability and localized osteoporosis in patients with BCRL.

[29] A PROSPECTIVE CLINICAL TRIAL IN WOMEN WITH NODE-POSITIVE BREAST CANCER TREATED WITH NEOADJUVANT CHEMOTHERAPY AND AXILLARY DISSECTION: FACTORS ASSOCIATED WITH LYMPHEDEMA (ACOSOG Z1071: ALLIANCE FOR CLINICAL TRIALS IN ONCOLOGY [ALLIANCE])

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Introduction: Lymphedema (LE) is a well-known complication from treatment of breast cancer, with recent data demonstrating that 10%-30% of breast cancer survivors will develop LE with latest treatment modalities. Most LE studies have included a heterogeneous population and focused on patients treated with adjuvant chemotherapy. This study describes LE risk in a homogeneous cohort of women with node-positive breast cancer treated with neoadjuvant chemotherapy (NAC) and axillary lymph node dissection (ALND).

Aim: Examine factors associated with LE after NAC and ALND in node-positive breast cancer.

Method: Patients who consented to the American College of Surgeons Oncology Group (ACOSOG) Z1071 (Alliance for Clinical Trials in Oncology [Alliance]) LE substudy had prospective arm measurement and symptom assessment performed after NAC completion and at six-month intervals to 36-months post-operatively. In total, 701 women ≥18 years with cT0-T4, N1-2, M0 breast cancer with documented axillary nodal metastasis at diagnosis were enrolled in Z1071 study, of whom 486 consented to the LE substudy. All participants received NAC, breast surgery, and ALND. LE was defined as self-reported arm-heaviness-or-swelling (LE-symptoms) or arm-volume-increase of ≥10% (LE-V10) or ≥20% (LE-V20-severe). Kaplan-Meier methods were used to determine cumulative incidence. Cox models were used to evaluate association between baseline patient and disease characteristics and time to a LE event. Duration of neoadjuvant chemotherapy was analyzed by tertiles (<105, 105-144, ≥144 days).

Results: Of 486 patients (median age=49 years, range 23-78), cumulative LE incidence was 37.8% (95%CI: 33.1-43.2%) by LE-symptoms; 58.4% (95%CI: 53.2-64.1%) by LE-V10; and 36.9% (95%CI: 31.9-42.6%) for LE-V20-severe at 3 years. Factors identified by univariable analysis to be associated with LE-symptoms were body mass index (BMI) and NAC ≥144 days, HR=1.04 (95%CI: 1.01-1.06) and HR=1.48 (95%CI: 1.01-2.17), respectively, whereas surgical procedure, chemotherapy regimen, patient age, and radiation therapy were not associated. NAC ≥144 days was also associated with LE-V20-severe incidence, HR=1.79 (95%CI: 1.19-2.68). Increase in the number of positive nodes (HR=1.03; 95%CI: 1.00-1.06) and ≥30 nodes removed (HR=1.70; 95%CI: 1.15-2.52) were associated with LE-V10. Obesity (BMI ≥30) was significant on multivariable analysis for LE-symptoms, and NAC-length for LE-V20-severe.

Conclusions: Incidence of LE was higher with longer duration of NAC and patient obesity. This identifies groups where enhanced LE surveillance may be beneficial. Further work exploring this is warranted.

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[30] A MULTI-CENTER SURVEY TO ASSESS THE OUTCOMES OF FLUOROSCOPY GUIDED MANUAL LYMPHATIC DRAINAGE (FG-MLD) USING BELGRADO 'FILL AND FLUSH' TECHNIQUE

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Introduction: Manual lymphatic drainage (MLD) is recognised as a key component for treatment of Lymphoedema and its management. Unfortunately this treatment is being removed from lymphoedema management protocols throughout the world due to a lack of robust evidence on its effectiveness. Indocyanine green within lymphofluoroscopy imaging has provided a tool to evaluate differing methods of MLD. This led to the development of the fluoroscopy guided manual lymphatic drainage technique (FG-MLD/Belgrado 'Fill and flush'). To date over 800 therapists have been trained in the technique across the world through Lymphoedema Training Academy (LTA). To address deficit in the evidence available for MLD, a survey has been carried out to evaluate the effect, but also the ease of application of the FG-MLD technique.

Aim: To evaluate the efficacy and ease of application of the FG-MLD technique in treating patient's with lymphoedema. To identify any challenges in the implementation of the technique and any modifications required alongside the effect upon outcomes for the user and patient.

Method: A cross-sectional (survey) approach was devised, with a purposive sample population, which consisted of trained therapists/healthcare professionals in the FG-MLD technique via the LTA. Invitations were sent to individuals and resulted in a 25% acceptance rate to participate. The data collection period took place between 4th of December 2018 and 14th of February 2019. Data collated via the survey involved 1) Limb volume change pre and post treatment and after completion of Combined Decongestive Therapy (CDT); 2) Tissue response, 3) Ease of FG-MLD technique, 4) Ability to individualize treatment, 5) Maintenance of patient outcomes between treatment sessions 6) Treatment times and therapist and patient experience.

Results: At the time of submission 40 individual evaluations have been received with further data collection continuing until the closing date. Initial analysis of the 40 evaluations indicate that the Fill and Flush™ technique is easy to apply, safe, and has a fast response rate with good patient outcomes on treatment

Conclusions: Lymphofluoroscopy has allowed for the identification of hand movement and new drainage pathways that help with Lymphoedema management. This survey will assist with the maintenance of MLD as a treatment modality by demonstrating the affect of MLD and how it can easily be fitted into everyday patient care.

[31] A PRELIMINARY ANALYSIS OF PATIENTS SCREENED FOR EARLY BREAST CANCER-RELATED LYMPHEDEMA USING VOLUMETRIC ARM MEASUREMENTS AND BIOIMPEDANCE SPECTROSCOPY: A COMPLEMENTARY ROLE

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Introduction: Patients treated for breast cancer (BC) with axillary surgery or regional lymph node radiation (RLNR) are at lifelong risk of breast cancer-related lymphedema (BCRL). Recommendations advise screening using objective measurements incorporating presurgical baselines. However, various measurement modalities with different diagnostic thresholds exist.

Aim: To investigate the relationship between relative volume change (RVC) measured with perometry and LDex values measured using bioimpedance spectroscopy (BIS) when screening for BCRL.

Method: 125 women treated for BC from 2011 to 2018 with unilateral surgery were enrolled and screened for BCRL using perometry and BIS preoperatively and throughout follow-up. Patients had baseline measurements and at least one follow-up. Linear regression models assessed the correlation between RVCs and LDex scores, and descriptive statistics summarized features of the data.

Results: 436 measurements were collected with a median of 3.5 measurements per patient over a median follow-up of 11.1 months. Baseline LDex measurements ranged from -18.2 to 21.5, with a median follow-up score of 1.30. Multiple thresholds for abnormal LDex were compared to current RVC thresholds for diagnosis, including the recent recommendation of 6.5 LDex increase from baseline. Changes in LDex of 6.5, 7, and 10 from baseline were not associated with an RVC of 5-10% (OR: 0.66, p=0.396; OR: 0.69, p=0.453; OR: 0.38, p=0.194 respectively). A change in LDex of 6.5 units was not associated with an RVC≥10% (OR: 2.46, p=0.289). On univariate analysis, increases in LDex within three months of surgery were not associated with a future RVC of 5-10% or ≥10%. Further, history of axillary lymph node dissection (OR: 2.33, p=0.022) and RLNR (OR: 2.14, p=0.013) were both associated with a change in LDex≥6.5. Of the 5 patients with a maximum RVC≥10%, 4 presented with their maximum LDex before maximum RVC. For patients who had an RVC >5% but a LDex change <6.5, 16/30 patients' RVCs receded to less than 5% without treatment. Of the patients with an LDex change of >6.5 but an RVC <5%, 21/38 patients' LDex change receded to <6.5 after that measurement without treatment.

Conclusions: Preliminary analysis demonstrates no correlation between RVC and LDex change from baseline. A significant proportion of patients exceeding current diagnostic thresholds on either perometry or BIS receded below these thresholds without intervention. Both BIS and volumetric methods play a role in early diagnosis, and further research with a larger cohort of patients is needed to better understand how these modalities complement each other in BCRL-screening.

[32] A PILOT STUDY EXPLOITING 3D SCANNING TECHNOLOGY IN LYMPHOEDEMA FOR ACCURATE MEASUREMENTS OF VOLUME AND SHAPE

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Introduction: Lymphoedema is diagnosed by means of patient information, clinical observation and measurement of the affected limb(s). The most commonly used method of measurement within a clinical setting in the UK is circumferential tape measurement, however, it is recognised as being unreliable due to interrater and intrarater variability. A more reliable method of circumferential volume measurement is the perometer, with an ICC of 0.953-0.999, but it is cost-prohibitive within most clinics.

Use of an off-the-shelf PC motion sensor has been explored for use in volumetric reconstruction in lymphoedema, with feasibility studies identifying highly accurate volumetric data and an ICC of 0.946.

A pilot study was designed to compare these three methods of assessment, and to look at the possibility of limb shape as a new method of measuring for lymphoedema.

Aim: To test the reliability and accuracy of results obtained from 3D camera imaging, including shape.

Method: A purposeful population of 20 new patients with unilateral upper limb lymphoedema. Exclusion criteria included reduced shoulder movement (below shoulder height), inability to meet review commitments and comorbidities exacerbating lymphoedema. Ethical approval was granted June 2016, and R&D approval gained August 2016.

Physical examinations were performed at initial assessment, and at two, four and six-month reviews. These included two 4cm circumferential measurements, limb volume measurement by perometer and imaging with a 3D camera.

Results: Twenty participants were recruited, with three failing to complete the study. Collaboration with Swansea University in deciphering the camera data identified good correlation in volume differences between all three tests (within 95% confidence interval).

Data gained through regression methodology to detect change in limb shape demonstrated good sensitivity. New oedema maps provide a colourful and meaningful format for identifying areas of most swelling in a lymphoedematous limb.

Conclusions: Results show a good correlation in volume differences. There is good sensitivity to change in limb volume between all three methods of measurement. Limb shape, as a new method of lymphoedema measurement, is proving reliable and effective.

[33] REVISION OF THE CASLEY-SMITH MLD ROUTINE BASED ON ICG SCANNING

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Introduction: Advancements in scanning for lymphoedema, incorporating Indocyanine Green (ICG) lymphography, has improved the understanding of lymphatic function and lymphoedema distribution. ICG scanning has supported new lymphoedema classification systems as well as treatment for lymphoedema, including Lymphovenous Anastomosis (LVA) surgery and Fluoroscopy Guided Manual Lymph Drainage (FG-MLD).

The use of ICG scanning in real time has prompted constructive discussion within the Macmillan Lymphoedema Association (MLA) in the UK, and inspired the group to review their evolving Casley-Smith MLD techniques.

Aim: Investigate and appropriately revise the Casley-Smith MLD routines based on evidence demonstrated by ICG lymphography.

Method: Three MLD teachers (healthy subjects) and three volunteers with lymphoedema were injected with ICG dye. The lymphatics were scanned using the Fluoptics Fluorescence Imaging (Fluobeam, France) unit. Techniques used during the MLD routine were reviewed and various movements and exercises were tested to determine how these may or may not influence lymph flow.

Results: Effleurage of the neck did not show benefit, however two-way stretches of the neck demonstrated increased rate of flow in the lower leg. Axilla and groin clearance displayed better movement of fluid through activity as opposed to two-way stretches. In general movement and exercise demonstrated better lymph flow compared to massage techniques. Deep massage techniques were also more beneficial in areas of congestion as opposed to effleurage, however a combination of techniques had best outcome in terms of movement of fluid.

Conclusions: The Casley-Smith MLD routine has been altered to include exercises pre-and post-MLD. All lymph node clearance is now done through movement where possible. The block and unblock techniques are now obsolete. Fibrosis techniques are encouraged in more challenging areas of swelling, but drained by effleurage as per Casley-Smith MLD routine. The exercises are translated into SLD routines for patients to continue self-management improving lymphatic flow. The use of technology has proven to facilitate advances in lymphoedema MLD.

[34] STADIATION OF LIPEDEMA BY THE CLINICAL AND INSTRUMENTAL SUPPORT

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Introduction: There are various types of localization in the limbs of patient affected by Lipedema: buttocks, thighs and legs, with prevalence in thighs; buttocks, thighs and legs, with heads in legs; buttocks, thighs, legs and arms; buttocks, thighs, legs, arms and forearms with prevalence in thighs and arms; buttocks, thighs, legs, arms and forearms with prevalence in legs and forearms. The cuffing sign is always present at ankles and wrists. The interest of the feet and the hands is only late and testifies a secondary involvement of loco-regional lymphatic transport.

Aim: The clinical staging of Lipoedema, currently used in clinical practice (Meyer-Vollrath and Coll, 2004 which divides clinical frameworks in the three stages) appears outdated for a better clinical and instrumental framework of the pathology, that we can perform to the present day.

Method: From the clinical and instrumental analysis of 225 cases of familial lipoedema, the authors propose the following clinical and instrumental staging, based on the objective examination and the execution of lymphoscintigraphy, high resolution ultrasound and tonometry:

Results: Stage 1: Sub-clinical forms (consanguines of patients with a positive name) or mild oedema affecting classical sites without cutaneous deformation, with a negative lymphoscintigraphy examination for alterations of lymphatic transport, ultrasound It shows localized and homogeneous increase of the suprafascial thickness and tonometry within the limits of the norm; feet and hands are free from oedema.

Stage 2: Edema affecting the classic storage sites with circumscribed deformation of the cutaneous profile; feet and hands are free from oedema; Initial subversion of the adiposis lobules at ultrasonography; mild dermal back flow at lymphoscintigraphy; tonometry with decreased or increased values (A, B)

Stage 3: Edema affecting the classical sites with serious deformation of the cutaneous profile circumscribed to some areas; feet and hands are free from oedema. Moderate dermal back flow at lymphoscintigraphy; Partial subversion of the adiposis lobules at ultrasonography; tonometry with decreased or increased values (A, B)

Stage 4: Edema affecting classical sites with total subversion of the cutaneous profile throughout the limb; Feet and hands with oedema, that can be conducted. Marked and diffuse dermal back flow with the presence of one or more lymph node stops along the limbs; total subversion of the adipose lobules at ultrasound examination; tonometry with decreased or increased values (A, B).

Conclusions: The AA will continue with clinical observations to broaden the case for the benefit of diagnostic, therapeutic (physical, medical and surgical) and prognostic addresses.

[35] WOMEN WITH LIPEDEMA HAVE LEAKY CAPILLARY DERMAL SKIN VESSELS COMPARED TO CONTROLSMarisol Allen¹, Karen Herbst¹, Anastasia Miramontes¹¹ 1501 N Campbell Ave, Medicine, Tucson, United States

Introduction: Lymphedema causes fluid accumulation in tissues, creating spaces around blood vessels in skin (Lymphology 42;2009:105). Lipedema is a painful disorder of excess fat on the lower body of women that resists loss and increases the risk of lymphedema. Lipedema, lymphedema and BMI worsens by stage. Capillaries in lipedema skin can have perivascular spaces and accumulate immune cells and altered endothelium, a leaky vessel phenotype

Aim: Since fluid shifts from the trunk to the lower body on standing, the aim of this study was to determine if a leaky phenotype was present in the thigh of women compared to abdomen and if vessels would be leakier in lipedema compared to controls.

Method: 5 mm skin punch biopsies were collected from the thigh or abdomen. All vessels in the reticular and papillary dermal skin samples were scored for leaky or non-leaky phenotype by microscopy at 40x magnification by two different observers then averaged. Data was analyzed by ANOVA, linear regression, unpaired and paired t-tests (Graphpad Prism 7).

Results: Women with lipedema: n=44; age= 46 +/- 1.5; BMI=33.78 +/- 1.37. Control women: n=24; age= 38 +/- 2.5 ; BMI=26.4 +/- 1.18. Women with lipedema had a higher percentage of leaky vessels in the thigh (43.8 +/- 19.3) compared to the abdomen (18.9 +/- 15.6; P=0.0001), as did control women for thigh (25.1 +/- 14.5) compared to abdomen (13.1 +/- 12.6; P=0.009). Women with lipedema had more leaky vessels in the thigh (P<0.0001) but not the abdomen compared to controls. In 15 age (P=0.8) and BMI (P=0.6) matched women, lipedema stages 1 and 2, and 15 controls, percent of leaky vessels in the thigh was significantly higher in lipedema (P=0.004). Interestingly, there were significantly more leaky vessels in the thigh of women with Stage 1 (n=14; P<0.001) and Stage 2 (n=20; P=0.003) but not Stage 3 lipedema (n=10) versus controls. The greater the BMI, the fewer leaky vessels in women with lipedema (r²=0.12; P=0.02), driven by fewer leaky vessels in women with Stage 3 lipedema.

Conclusions: Fluid shifts on standing influence micro-vessels in the skin towards a leakier phenotype in the thighs compared to the abdomen of women, and this occurs significantly more often in lipedema thigh skin. These data suggest a microangiopathy is likely in lipedema. The non-leaky microvessels in women with Stage 3 lipedema and higher risk for lymphedema, suggest the lymphatic vessels may play a greater role in this stage.

[36] CHRONIC PAIN IN LIPOEDEMA: ARE THERE INDICATORS FOR NOCICEPTIVE, NEUROPATHIC OR CENTRAL SENSITIZATION PAIN?Wouter Hoelen¹¹ De Berekuy, Hierden, Netherlands

Introduction: To this date it is not uncommon for lipoedema patients to be misdiagnosed and thus mistreated due to lack of diagnostic tools and clinical knowledge. The progressive, chronic nature of this condition can provoke other conditions ranging from venous decongestion, lipo-lymphoedema and eventually immobility. Therefore early recognition can make a difference and possibly prevent the progression of this condition.

One of the key features for the diagnosis of lipoedema is the variation in pain levels (mild – extreme) and its manifestation.

Aim: In most cases predominant pain existing for longer than 3 months is present, thus suggesting the presence of a chronic pain condition. The pathophysiology around and the origin of the perceived pain in lipoedema patients, regardless the stage of disease, is yet unknown. Hence, the question arises if a stratification for pain using an algorithm to determine nociceptive, neuropathic, central sensitization or a mixed pain classification, might lead to better pain intervention strategies and pain coping styles.

Method:

Cross sectional study; 45 diagnosed women with lipoedema grade I-III are included in this study.

Results: ongoing research (Jan-May 2019), preliminary results will be presented

Conclusions: ongoing research (Jan-May 2019), preliminary results will be presented

[37] THE CLINICAL CHARACTERISTICS OF LIPEDEMA PATIENTS AND AWARENESS ABOUT LIPEDEMA IN A GROUP OF PATIENTS REFERRED TO A LYMPHEDEMA UNIT

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Introduction: Lipedema is a chronic, incurable condition that can have a severe impact on quality of life, physical and psychosocial well-being. As the awareness of health professionals is low, lipedema is commonly misdiagnosed as lymphedema or obesity.

Aim: The aims of this study were to evaluate the frequency and characteristics of lipedema patients and determine their awareness about this condition in a lymphedema unit.

Method: All patients who referred to lymphedema unit were screened and the frequency of lipedema was determined according to the diagnostic criteria (1). The demographic and clinical characteristics of lipedema patients were recorded.

Results: A total of 378 patients had referred to lymphedema unit, between September 2017-December 2018. 92 (24%) them had lipedema component. All but one patient were women with a mean age of 56,22 years. Of the 92 patients 39 (42,4%) had pure lipedema, 43 had lipolymphedema (46,4%) and 10 had phlebolipedema (10,9%). The mean BMI was 36,8 kg/m² and most of the patients were obese. 3 (5,7%) patients had stage 1, 11 (20,7%) had stage 2 and 39 (73,6%) had stage 3 lipedema (2). The most common involvement was determined as type 3 (60,4%) followed by type 2 (20,7%), type 4 (13,2%) and type 1 (5,7%) according to classification criteria (3). Most of the patients had involvement of more than one type. A positive family history was present in 37,8% of the patients. The most common comorbid conditions were hypertension (41,3%), diabetes mellitus (17,4%), and hypothyroidism (17,4%). Only 19(20,7%) of the patients had knowledge about lipedema and 17 (18,5%) patients were diagnosed as lipedema before they referred to our unit.

Conclusions: The frequency of lipedema is greater than expected in our lymphedema unit. Half of them had lipolymphedema as secondary complication and due to late diagnosis. The BMI was higher in majority of the patients. The awareness about lipedema is low among patients and families. We suggest educational activities for both patients and health professionals about lipedema in order to facilitate early diagnosis and realistic therapeutic approaches for this suffering population.

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[38] THE EFFECT OF LIPEDEMA ON GAIT - A CASE-CONTROL STUDY

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Introduction: Lipedema is a chronic disorder with a disproportional deposition of usually painful subcutaneous adipose tissue on the lower body that can change gait and physiologically strain the joints, negatively affecting mobility.

Aim: Quantify effects of lipedema on gait by increasing severity of the disorder and compared to age and BMI matched controls.

Method: We evaluated 31 women with lipedema (6 Stage 1, 17 Stage 2, 8 Stage 3); mean age 44 (19 -78); mean BMI 31.1 (19.4-44.5). A subset of 23 women with lipedema were matched by age (± 7 years) and BMI class with 23 controls.

Lipedema stage and anthropomorphic data were collected from a physical exam. Temporo-spatial parameters (TSPs) of gait were assessed with a GAITrite electronic walkway, and information on pain levels and mobility collected by electronic questionnaire. Heart rate and pain levels before and during the walkway trial were recorded.

Results: Matched Subset: During the walking trial, women with lipedema had significantly higher maximum heart rates compared to controls, which correlated positively with BMI in the control, but not the lipedema group. Women with lipedema reported significantly more pain than controls both before and during the walking trial, and lower mobility (not significant). BMI negatively correlated with mobility in the control but not the lipedema group.

Women with lipedema tended to walk slower, take shorter steps, and had a wider stance compared with controls. Affected women's gait TSPs also showed more variability than controls.

Larger thigh girth positively associated with a wider stance among women with lipedema, and with greater stride velocity, and increased step and stride length among matched controls.

Lipedema Stages: As lipedema stage increased, women took shorter steps, spent more time in the double support phase, and showed significantly greater toe-out; toe-out correlated positively with knee girth. Women with Stage 3 lipedema also reported decreased mobility, especially climbing stairs, and increased pain compared to Stage 1.

Conclusions: Women with lipedema walked differently than control women of similar age and BMI, taking wider, shorter, more toe-out steps, with greater pain and decreased mobility. Increased adipose tissue on the lower extremities in lipedema may be a contributing factor, as differences in gait parameters correlate with increases in thigh and knee girth. Increased heart rate in women with lipedema on standing then walking may be compensatory due to a fluid shift from the trunk to the larger lower extremities reducing stroke volume.

[39] DIAGNOSED: NOW WHAT?Andrea Brennan¹¹ Brennan School of Innovative Lymphatic Studies/Casley-Smith Treatment Method, Scottsdale, United States

Introduction: Enlargement of lower extremities often times is associated with obesity. Clinically, gynoid fat distribution is symmetrical. Thus, the healthcare professional commonly mistakes the progression of weight gain as the sole cause of enlargement of the lower extremities. Lifestyle induced obesity is different from excess gynoid fat of lipedema. Excessive weight can have a negative impact on the return of lymphatic fluid from the legs. Lipolymphedema may develop. This adversely affects patients in terms of physical suffering and pain, impaired function, and diminished quality of life. Furthermore, persistent relapses have a significant influence on individual employment status and work-related productivity. In addition to the significant burden on patients and their families, lipolymphedema represents a sizable burden to society due to high healthcare and non-healthcare related costs. Decongestive lymphatic therapy may ameliorate these consequences.

Aim: To illustrate how decongestive lymphatic therapy can have positive treatment outcomes, as well as improvement in quality of life and functional mobility

Method:

- Literature review**

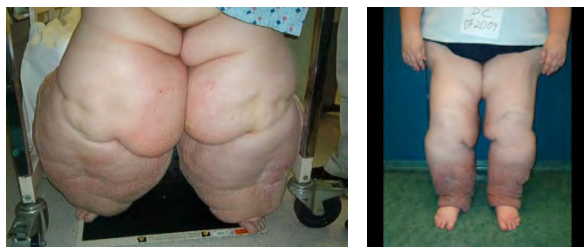
The purpose of this literature review is to provide an overview of research studies published from 2005 to 2018 in the English language with keywords (including but not limited to): lipedema, lymphedema, obesity-induced lymphedema, obesity, gynoid fat, decongestive lymphatic therapy, from the perspective of both the health consumer and the health professional.

- Case series**

Descriptive study following three patients who have a similar diagnosis, lipolymphedema and who are undergoing decongestive lymphatic therapy.

Results:

1. Amazing as depicted in the photos



Conclusions: Lipolymphedema is commonly misdiagnosed. It is essential to recognize its uniqueness for proper treatment. Review of the literature indicates an increase of literature to guide healthcare professionals in making the correct diagnosis. However, the literature lacking in what the proper treatment is. The goal of treatment is to improve symptoms, prevent secondary complications, while enhancing quality of life. Decongestive lymphatic therapy is essential for life long sustaining management of lipolymphedema.

[40] BODY MASS INDEX (BMI) TRENDS OVER SEVEN YEARS FOR PERSONS WITH BREAST CANCER-RELATED LYMPHEDEMA (BCRL)Allison Anbari¹, Chelsea Deroche¹, Jane Armer¹¹ University of Missouri, Sinclair School of Nursing, Columbia, United States

Introduction: Early detection and prospective surveillance of breast cancer (BC)-related lymphedema (BCRL) are important, as early treatment can reduce complications and functional decline, ideally maintaining pre-diagnosis quality of life (QOL). Higher body mass index (BMI) at BC diagnosis places survivors at higher risk for developing BCRL.

Aim: 1) What are the seven-year BMI trends for BC survivors with BCRL compared to those without BCRL? 2) Are BMI changes for survivors with BCRL associated with changes in QOL?

Method: Seven-year BMI trends for Breast Cancer and Lymphedema Study participants (BCRL: n=144; non-BCRL: n=167) were reviewed. Participants self-reported BCRL using the reliable and validated Lymphedema and Breast Cancer Questionnaire (LBCQ). Participants completed the LBCQ yearly and were included in the BCRL group with an answer of “yes” to the question “Have you been told you have LE?” at any time. BMI was measured at each lab visit.

Participants also completed the 36-Item Short-Form Health Survey (SF-36) annually. Using a repeated-measures general linear mixed-model with a variance-components covariance structure, controlling for age and region, changes in the SF-36 QOL domains were examined in relation to BMI changes over seven years.

Results: Participants later diagnosed with BCRL commenced BC diagnosis and treatment with a higher mean BMI than the participants who were not later diagnosed with BCRL (p=0.02). Over seven years, participants with BCRL who were <55 years old at diagnosis showed a BMI change of 0.4749 kg/m² higher on average than those who were ≥55 years old. Rural/urban residence was not associated with BMI change or development of BCRL.

For participants with BCRL (n=144; 559 observations), there were statistically significant associations of BMI change and three SF-36 domains. Role change due to emotional health (p=0.03), social functioning (p=0.01), and energy/fatigue (p=0.04) were associated with BMI change. An increase in SF-36 scores related to role change due to emotional health and energy/fatigue was associated with a decrease in BMI. An increase in social functioning was associated with an increase in BMI.

Conclusions: BC patients with higher BMIs should be taught about BCRL signs and symptoms early in their BC diagnosis. Although outcomes are modest here, BCRL impacts QOL. Education and early detection in survivors at high risk for BCRL may preserve QOL.

[41] DEVELOPMENT OF LYMPHATIC WIRE FOR DETECTION OF LYMPH COLLECTORS IN TREATMENT OF PERIPHERAL LYMPHEDEMAJiro Maegawa¹, Shinya Kitayama¹, Yuuichiro Yabuki²¹ Yokohama City University, Plastic and Reconstructive Surgery, Yokohama, Japan² Yokohama City University Hospital, Yokohama, Japan

Introduction: Lymphatic venous anastomosis is one of common surgical procedures for peripheral lymphedema. Near infrared fluorescent lymphangiography is useful to detect the lymph collectors during surgery, however, in the areas with thick subcutaneous tissue and dermal back flow it is difficult to detect them. To overcome this problem we developed a small diameter wire, “lymphatic wire” that can be inserted into lymph ducts.

Aim: The aim of this report is to show a possibility to apply endovascular treatment to treatment for peripheral lymphedema.

Method: The basic structure of lymphatic wire is the same as the existing guide wire for blood vessels. Its material is Nitinol, which consists of nickel and titanium. The maximum outer diameter is 250 μm (0.099 inches) and tapered toward the tip. In that part of the tip, gold is wound in a coil shape and made moderate mobility. The whole is coated with a hydrophilic polymer. Animal experiments were performed on the hind limbs of 6 swine to evaluate operability and injury associated with the use of lymphatic wires.

Results: Although damage to the inner membrane was recognized slightly, adverse events such as valve dysfunction and penetration were not identified. In few clinical cases we identified subcutaneously existed lymph ducts even at sites difficult to observe with near infrared fluorescent lymphangiography such as femoral region, and then we could anastomosis with the neighboring vein.

Conclusions: It was suggested that the lymphatic wire seemed to be useful as a new lymph vessel identification method. However, an auxiliary device such as an X-ray fluoroscope is necessary for safe use. This will be an introduction of endovascular treatment for peripheral lymphedema.

[42] ALIGNED NANOFIBRILLAR COLLAGEN SCAFFOLDS CAN TREAT INDUCED LYMPHEDEMA IN RATS

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Introduction: To expand treatment options for lymphedema patients, we have investigated lymphatic regeneration guided by thread-like scaffolds made from aligned collagen fibrils. The scaffold supports interstitial flow and facilitates cell attachment, alignment, and migration. Preliminary clinical data related to the use of BioBridge for lymphedema treatment demonstrate reduction in edema volume.

Aim: Rat hindlimb lymphedema model was employed to test our hypothesis that implantation of nanofibrillar collagen scaffolds (BioBridge) can (1) reduce lymphedema when used in animals with developed lymphedema and (2) prevent lymphedema in animals when employed at the time of lymphedema induction surgery.

Method: The rat lymphedema model involved inguinal and popliteal lymphadenectomy followed by radiotherapy. Subjects in the prevention group received implantation of BioBridge immediately after lymph node resection. Subjects that developed lymphedema one month after lymphadenectomy/radiation either received implantation of BioBridge with autologous adipose-derived stem cells (ADSC; treatment group) or remain untreated (control group). All subjects were observed for 4 months after lymphadenectomy. The hindlimb volume was measured before, and one and four months after lymphadenectomy, using CT-based volumetric analysis, and the change in affected to unaffected limb volume ratio was evaluated. Lymph flow and lymphangiogenesis was also assessed by ICG fluoroscopy.

Results: Subjects in the treatment group showed a reduction in affected limb volume (affected/non-affected limb volume ratio decreased from 113 to 97% ($p < 0.02$)), and animals in the prevention group showed no increase in the affected limb volume ($p < 0.01$). ICG fluoroscopy demonstrated restoration of lymph flow in the affected regions and formation of new lymphatic vessels going toward the contralateral groin.

Conclusions: These data show that in the rat lymphedema model, (1) implantation of BioBridge at the time of lymph node removal prevents development of lymphedema, and (2) treatment of established lymphedema with the BioBridge and ADSC reduces lymphedema.

[43] ACQUIRED LYMPHATIC PUMP FAILURE AND THERAPEUTIC RESTORATION IN A MOUSE MODEL OF LYMPHEDEMA

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Introduction: It has been suggested that many forms of secondary lymphedema in humans are driven by a progressive loss of lymphatic pump function after an initial risk-inducing event.

However, the link between pump failure and disease progression has remained elusive due to experimental challenges in the clinical setting and a lack of adequate animal models. Moreover, mouse models of lymphedema involve a complete disruption of the lymphatic vessels that drain the effective limb and result in immediate lymphedema, a process that is not reflective of the partial disruption of the lymphatic vasculature, and gradual decline of lymphatic function and resulting disease onset that occurs clinically.

Aims of Study: We therefore sought to develop a mouse model of partial lymphatic disruption that drives future lymphatic pump failure, and then to test this model against an antiinflammatory therapeutic that has shown efficacy in preventing fibrosis in other lymphedema models, to determine if this approach would correct lymphatic pump failure. **Methods:** Using a novel surgical model of lymphatic injury, we track the adaptation and functional decline of the lymphatic network in response to surgery. Specifically, a partial circumferential incision is made around the base of the mouse tail, disrupting some of the initial lymphatic capillaries and cauterizing one of two collecting lymphangion chains that drain the tail while leaving one chain intact.

Results: Mice presented with histological hallmarks of the typical tail lymphedema model while leaving an intact collecting vessel to drain the tail. In mice with tail swelling greater than 20%, lymphatic function in the intact vessel negatively correlated with swelling ($p < 0.05$), while mice with swelling below this threshold showed minimal loss of function. Moreover, mice with swelling exhibited a significant loss in lymphatic pumping pressure ($p < 0.01$) that persisted even after resolution of swelling. In mice fed a high-fat diet, obesity exacerbated the acquired lymphatic failure following injury, and obese mice exhibited persistent loss of pumping pressure for 70 days after the initial insult ($p < 0.05$). Obese lymphedema mice were treated via topical application of tacrolimus ointment beginning 14-days after induction of lymphedema, and pumping pressure was restored in these mice by day 28 and function remained up to day 70.

Conclusions: We demonstrate that a secondary injury to an intact collecting lymphatic vessel can occur as the intact vessel remodels in response to an initial surgical insult, and presented evidence that pump dysfunction in this model can be restored pharmacologically.

[44] PHENOTIPIC ASPECTS OF PRIMARY LYMPHOEDEMA IN CELSR1 MUTATIONS

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Introduction: CELSR1 is a member of the cadherin superfamily. It is involved in planar cell polarity and is known to play a role in valve formation and function in murine lymphatics. Only one paper, published in 2016, has described an association between a truncating mutation in *CELSR1* and hereditary lymphedema in a large family.

Aim: The aim of this study was to evaluate the frequency of *CELSR1* mutations in lymphedema patients in order to establish its utility in routine genetic testing. An overall estimate of the frequency of genes involved in lymphedema is also reported.

Method: The genetic analysis of 132 probands was performed using next-generation-sequencing with a panel including the 11 genes known to be linked to inherited lymphedema, as well as *CELSR1*.

Results: We identified seven new pathogenic or likely pathogenic loss-of-function variations in *CELSR1* in seven unrelated probands. In some cases, we extended the test to their relatives. Lymphedema caused by *CELSR1* variations was almost fully penetrant in females (six out of seven females (86%) with a *CELSR1* mutation manifested lymphedema) but not in males (only one out of four males, i.e. 25%). Overall, genetic testing proved positive in 12% of cases, negative in 71% and inconclusive in 17% of the patients tested.

Conclusions: *CELSR1* variations explain about half the lymphedema patients positive to genetic testing. Since the percentage of lymphedema patients caused by *CELSR1* loss-of-function variations is not negligible (7 out of 132 patients, 5.3%), we definitely recommend including this gene in routine genetic testing.

[45] PHYSICAL AND SURGICAL TREATMENT IN PRIMARY AND SECONDARY LYMPHOEDEMA: CLINICAL RESULTS

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Introduction: Treatment of primary and secondary lymphedema requires a multidisciplinary and multi-professional approach. The patient's expectations are often not satisfactorily fulfilled, and this leads to the realization of the phenomenon known as 'medical nomadism', for which the patient himself is constantly looking for new health teams to solve his problem.

Aim: The aim of this work was to analyze the real effectiveness of the surgical interventions currently performed in lymphedema.

Method: The AA analyzed three-year of clinical outcomes in two groups of patients: Group A (patients treated with surgery, associated to decongestive physical treatment) and Group B (patients underwent only decongestive physical treatment).

239 patients were studied (142 females and 96 males between the ages of 29 and 67); 112 (Group A) underwent surgery (40 microsurgical or reconstructive microsurgery, 7 lymph node transplants, 49 supermicrosurgery, 14 liposuction, 2 multiple fasciotomies) + decongestive physical treatment and, 127 (Group B) only for decongestive physical treatment. The two groups were homogeneous by age, clinical stage and form (primary or secondary).

Results: The results show an average major decrease in volume and consistency of limbs in 16% of patients in group A compared to group B; more evident results were observed in the mean decrease in lymphangitis episodes (47% higher in group A patients, with prevalence in subjects operated with supermicrosurgery technique, respect to 27% of Group B). In one case, undergoing a fasciotomy surgery, there was an appearance of recurrent postoperative lymphangitis (absent before surgery).

Conclusions: In the light of these results the Authors consider appropriate a more thorough study of the candidate patients to surgery to have a better result, by means of a better clinical and instrumental definition, in association with clinical lymphologists and surgeons.

[46] ARTIFICIAL DRAINAGE OF LYMPHATIC FLUID: TOWARDS THE CLINICAL TESTING OF AN IMPLANTABLE PUMP FOR THE TREATMENT OF CHRONIC EDEMA

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Introduction: We previously proposed an innovative approach to restore continuous lymph flow in lymphedema based on the implantation of an artificial lymphatic vessel composed of a peristaltic pump and a drainage catheter. In a rat model of lower limb lymphedema, we showed that excess volume can be reduced by drainage of accumulated fluid with an implanted peristaltic pump (Triacca et al., EJVES, 2018).

Aim: Aims of the present study were to assess the technological feasibility of an implantable pump suited for human use, to test its functionality, via both bench testing and implantation in sheep, and to finalize its design for clinical use.

Method: The pump was designed following state of the art engineering principles, aiming to minimize the size of the implantable component. Materials were chosen according to their biocompatibility and mechanical properties. Devices were produced by CNC machining and pump characterization curve was obtained with bench performance testing. Obtained devices were implanted subcutaneously in the posterior limb of 6 Swifter sheep and connected to an outlet catheter inserted in the peritoneal cavity. Feasibility of the surgical implantation, device functionality (verified via lymphofluoroscopy) and device removal procedure were tested.

The results of the preclinical studies on rat and sheep were used as input for an improved version of the device, LymphoDrain, designed to be used in a pilot clinical study.

Results: We verified the technological feasibility of the implantable pump for the treatment of lymphedema and characterized pump flow rate and pressure head. We produced 12 fully functional prototypes, 6 of which were implanted in sheep. The implant procedure was easy to perform, and no post-surgical complications were observed. Device functionality was confirmed via lymphofluoroscopy, upon subcutaneous injection of indocyanine green on the distal side of the pump, and visualization of the drained dye in the outlet catheter of the device draining to the peritoneal space. The implanted devices were easily removed two weeks after implantation.

Following preclinical testing, further technological improvements were implemented on the device, and the design freeze of a device suitable for clinical testing was reached.

Conclusions: We designed and developed a fully functional prototype of the implantable pump for lymphedema treatment. Results from the implantation study in sheep demonstrated the feasibility of the surgical procedure and safety of the device. We then finalized the design of an improved version of the device, LymphoDrain, suitable for clinical testing.

[47] INTERMITTENT PNEUMATIC COMPRESSION AND THE EFFECT OF DIFFERENT COMPRESSION SEQUENCING FOR TREATING LOWER LIMB LYMPHOEDEMA

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Introduction: Decongestive Lymphatic Therapy (DLT) is recognised as the gold standard care of lymphoedema; however it is often regarded as time and labour intensive with low levels of patient adherence, particularly in relation to the compression component of treatment. Intermittent pneumatic compression (IPC) represents an adjunctive or alternative treatment modality; whilst effectiveness of IPC for the treatment of lower limb venous disease and ulceration has been demonstrated in existing research, an evidence base supporting its use in lymphoedema is yet to be established.

Aim: The study aims to: (i) evaluate the efficacy of IPC as a treatment for lower limb lymphoedema, and (ii) assess the effect of different compression sequencing modes in the IPC device (LymphAssist, Huntleigh Healthcare, UK). Mode one has been designed to mimic the manual lymph drainage process while mode two applies sequential compression in an ascending pattern up the limb.

Method: This randomised control study compares standard lymphoedema care plus use of an IPC device in mode one (n=25) versus standard lymphoedema care plus use of an IPC device in mode two (n=25). The inclusion criteria are 1) age 18 or over, 2) confirmed diagnosis of ISL stage II or III lower limb lymphoedema. Exclusion criteria were based on the contraindications to IPC as specified by the Lymphoedema Framework. Eligible patients who consent to take part follow a prescribed treatment regime consisting of a 5 week control period, followed by a 5 week intervention period during which they use their allocated IPC device on a daily basis.

Outcomes to be assessed at 5 and 10 week time-points include: changes in limb volume, occurrence of lymphoedema complications, changes in skin tone measures (elasticity and stiffness), impact on patient rated quality of life scores and concordance with treatment regimes. Ethical approval was granted by REC 6 [REC 18/WA/0114].

Results: Recruitment and data collection are ongoing and will be complete by May 2019

Conclusions: This study addresses an important evidence gap relating to the clinical effectiveness IPC in the treatment of lymphoedema. Full results will be presented.

[48] ARE COMPRESSION THERAPISTS TOO SUPERFICIAL? QUANTIFYING LIMB COMPRESSION THROUGH PRESSURE MEASUREMENTS AT THE SKIN SURFACE.

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Introduction: Compression therapy is one of the few medical practices where the therapeutic 'dose' is poorly quantified. This is due to a broad misunderstanding of how sub-bandage pressure measurements at the limb surface can be perturbed by the sensor shape, limb curvature, sensor calibration procedure and how these aspects relate to the internal pressure applied to the limb.

Aim: To relate surface pressure measurements made in regions of different curvature to the internal pressures realised throughout the cross-section of model limbs.

Method: Two model limb sections containing embedded polyethylene sleeves and rigid bone analogues were fabricated from soft silicone rubber. Since both limb sections had the same circumference, the average radius was equal (54 mm). One section was cylindrical whereas the other approximated the cross-section of a healthy calf with five distinct regions of different curvature ranging from 27-2000 mm radius. Pressure was applied by a single loop of bandage contacting the entire circumference under known tension and surface pressure was measured at 5 points around the circumference of each limb with a fibre-optic pressure sensor array that measures pressure independently of curvature[1]. Surface pressure was related to internal pressure throughout the cross-section by measuring flow through the polyethylene sleeves.

Results: For a bandage tension of 135 Nm⁻¹ the pressure around the circumference of the cylindrical limb section was invariant (16.3 ± 0.8 mmHg) and in accordance with Laplace's Law. This reflected the core limb pressure (15.3 ± 4.0 mmHg) determined by flow analysis. However, for the same tension applied to the anatomically-shaped section, surface pressure varied between 1.5 ± 1.4 mmHg at the flattest part of the shin to 34.0 ± 1.9 mmHg at the smallest radius. While surface pressure varied with curvature in close agreement with Laplace's Law, the pressure at the core of the anatomical limb (18.5 ± 4.5 mmHg) closely approximated those at the core of the cylindrical section.

Conclusions: Our results demonstrate that superficial sub-bandage pressure values are inextricably linked to limb curvature at the measurement location. We also show that the pressure applied at the core of the limb may be inferred from surface pressure measurement and propose a simple algorithm to do this by incorporating the measured value with the local and mean curvatures of the limb.

1. Parkinson, L.A., Papageorgiou, A.W. and Arkwright, J.W. *A curvature-independent high-resolution pressure sensor provides sub-bandage pressure measurement in accordance with Laplace's Law*. Measurement Science and Technology, 2019

[49] PATTERNS OF LYMPHEDEMA SYMPTOMATOLOGY: PHENOTYPIC AND BIOMARKER CHARACTERIZATION

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Introduction: More than 50% of breast cancer survivors without a diagnosis of lymphedema suffer daily from numerous and co-occurring lymphedema symptoms. Lymphedema symptoms are subjectively perceived indicators of abnormal biological or physiological changes that may or may not be observed objectively. Importantly, lymphedema symptoms may indicate an early stage of lymphedema for which timely intervention may prevent lymphedema from progressing into a chronic condition (i.e. arm lymphedema) that no surgical or medical interventions at present can cure. Little is known about the patterns of co-occurring lymphedema symptoms (i.e., the phenotype), the patient characteristics (e.g., demographic, clinical and behavioral factors) associated with and physiological (i.e., limb volume and lymph fluid level) and patient-reported outcomes influenced by lymphedema symptoms and symptom distress.

Aim: To use latent class analysis (LCA) to identify lymphedema symptom patterns and the association of such patterns with phenotypic characteristics and biomarkers.

Method: A prospective, descriptive and repeated-measure design. The sample of 140 participants were recruited from among consecutively-identified pre-operative patients and each participant was followed for 12 months after breast cancer surgery. Phenotype measures included symptoms, limb volume, and lymph fluid level. Biomarker data, demographic and cancer treatment-related data were collected.

Results: LCA identified three distinct lymphedema symptom classes at 8-week and 12-month post-surgery: low, moderate and severe symptom classes and associated phenotypic characteristics. Pre-surgery level of IL1-a, IL-6, IL-8, VEGF were associated with the severe symptom class at 8-week post-surgery. Patients in the severe symptom classes reported at about 14 symptoms and characterized by a higher than average prevalence of almost all 26 symptoms. Women in the severe symptom class had the highest lymph fluid level and limb volume. The moderate symptom classes also had higher lymph fluid level and limb volume change in comparison with the low symptom classes, a finding may serve as initial evidence that patients in the moderate symptom classes are at-risk patients.

Conclusions: The current study is the first to define lymphedema symptom patterns using LCA to empirically identify clusters of individuals reporting similar patterns and trajectories of lymphedema symptoms. The LCA model identified low, moderate and severe symptom classes at both 8 weeks and 12 months post-surgery and there was a significant association between the latent classes at 8 weeks and at 12 months. The association of inflammatory biomarkers at baseline with symptom classes at 8-week post-surgery suggests that such biomarkers may be used to predict risk for lymphedema symptoms.

[50] DIGITAL THERAPY FOR CHRONIC PAIN FOLLOWING BREAST CANCER TREATMENT

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Introduction: Despite current advances in cancer treatment, many breast cancer survivors still suffer daily pain. Digital therapy uses behavioral and lifestyle strategies to treat or manage health conditions, such as chronic pain or symptoms or optimizing management of chronic illness by utilizing web-and-mobile-based digital technology to deliver therapy and monitor progress. The-Optimal-Lymph-Flow™ (TOLF) is a patient-centered digital therapy that delivers safe, feasible, and easily-integrated-into-daily-routine therapeutic lymphatic exercises to manage chronic pain through promoting lymph flow and minimizing inflammation.

Aim: The purpose of the study was to evaluate the efficacy of TOLF digital therapy for chronic pain management following breast cancer treatment.

Method: A parallel, 12-week, randomized clinical trial (RCT) with control-experimental, pre- and post-test was used. A total of 120 patients were randomized. Participants in the intervention group received the lymphatic exercise intervention while those in the control group received the shoulder mobility exercise intervention. The intervention outcomes of pain, soreness, aching, and tenderness, and limb volume difference were evaluated. Descriptive, chi-square, t-tests and mixed effects models were used for data analysis.

Results: Participants in both intervention lymphatic exercise and shoulder mobility exercise group had significant improvement of pain at 12-weeks after intervention. Significantly more participants in the lymphatic exercise intervention reported free of pain, soreness, and aching. improvement in pain and QOL. No significant improvement in limb volume difference for both groups, yet fewer patients with $\geq 5\%$ limb volume differences comparing the affected and non-affected limb were found in the lymphatic exercise intervention group.

Conclusions: TOLF digital therapy consisting of therapeutic lymphatic exercises and shoulder mobility exercises is effective to manage chronic pain, including soreness, aching and tenderness following breast cancer treatment. Findings of the study provided the evidence for emerging digital therapy using behavioral strategies for pain, offering support for policy on behavioral management for pain.

[51] THE PELVIC FLOOR'S INVOLVEMENT IN GENITAL LYMPHEDEMA AND SO MUCH MORE

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Introduction: The genital region and sexuality is still taboo in most cultures and medical practices. This applies to the world of lymphedema also. Lymphedema research is lacking in incidence, symptoms, and treatment of genital lymphedema for both males and females. For any persons presenting with trunk and/or lower limb lymphedema, the genital region should be assessed, including internal on females if able. The area should not just be assessed for edema; yet, for other symptoms or conditions associated with lymphedema and the comorbidities. To do this, one must first have a better understanding of the pelvic floor, it's role in function, and signs/symptoms of dysfunctions in the area.

The pelvic floor is responsible for support of the pelvic organs, assistance in bladder and bowel control, aids in sexual function, and plays a key role in childbirth for women. When someone undergoes cancer treatment in the area and/or develops lymphedema in the area, all possible dysfunctions need to be explored. Is there muscle imbalance or spasm? Is there stress on the bowel or bladder? Is the person able to participate in intimacy without limitations? Is there pain or nerve involvement? What is the hygiene and skin integrity of the area? How are these symptoms or dysfunctions impacting the person's quality of life?

Aim: This presentation will discuss the importance of all of these concepts for a more complete understanding on how the pelvic floor plays an integral role with lymphedema of the trunk and/or lower limb. Available research by the presenter and other, plus the presenter's own experience with pelvic floor dysfunction and genital lymphedema will be explored. The attendees will leave the presentation with a better comprehension of the pelvic floor roles and signs of dysfunctions in general and how to incorporate this new knowledge into evaluation and treatment techniques for persons of all genders and ages with trunk and/or lower limb lymphedema.

[52] PREVENTION OF LYMPHOEDEMA AFTER AXILLARY CLEARANCE (ANC) BY EXTERNAL COMPRESSION SLEEVES RANDOMISED TRIAL: RESULTS OF PLACE TRIAL

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Introduction: Lymphoedema (LE) develops in 30% of women with early arm swelling (RAVI 4-9%) post ANC. Intervention with a compression garment before arm swelling becomes chronic is claimed to prevent lymphoedema but there is no randomised evidence. Arm swelling of 4 – 9% within 9 months of surgery predicts later development of lymphoedema. A small study claimed early intervention with compression arm sleeves prevented the development of chronic lymphoedema.

Aim: To determine if early intervention with external compression sleeves prevents early RAVI swelling (4-9%) progressing to lymphoedema in a randomised trial.

Method: A multicentre randomised open controlled trial testing (1) standard management (written advice, arm elevation, exercises and massage) versus (2) application of whole arm graduated compression garments (pressure 20-25mmHg:Sigvaris) to affected arm, and standard management for 1 year. Women randomised to compression garments received 4 garments (type 2 20-25mmHg) for 12 months. We compared the 1) Time to development of lymphoedema (>10% RAVI) from randomisation, 2) Quality of life (TOI and FACT B+4 ARM sub-scale). Women with breast cancer (n=1100) undergoing ANC consented to pre and postoperative arm measurements with a perometer and those developing a 4-9% increase in arm volume up to 9 months post-surgery were randomised. Statistical power: With 190 women randomised we had a 90% power to identify a conservative 30% difference (from 60% to 30%) in lymphoedema at 18 months after surgery.

Results: Between October 2010 and August 2016, 143 patients were randomised and 38 (27%) patients subsequently developed lymphoedema. LE rate by 24 months (as pre-defined by RAVI $\geq 10\%$ after randomisation) in patients randomised to 'no sleeve' was 30% (21/71) versus 26% in patients randomised to 'sleeve' (17/66: $p=0.62$). Twenty-six patients randomised to the 'no sleeve' group had a sleeve applied within 24 months and 13 subsequently developed RAVI $\geq 10\%$. In patients with BMI >30 LE was 43.5% sleeve arm and 45.5% no sleeve arm and for BMI <30 patients 15.2% in the sleeve versus 21.1% in the no sleeve arm.

Body Mass Index (BMI) pre-surgery predicted lymphoedema at any time point HR 1.08 (CI 1.02-1.14; $p=0.011$) with BMI >30 HR 3.09 (CI 1.11-8.54 compared to BMI ≤ 25) patients having the highest lymphoedema rate in both arms of the trial (sleeve: 10/23, 43.5%; no sleeve: 10/22, 45.5%). Compression sleeves after development of Lymphoedema improved QoL scores (FACT-B $p=0.007$:TOI $p=0.042$).

Conclusions: Early intervention with Type 2 External Compression garments does not prevent lymphoedema, particularly in women with a BMI >30 .

[53] RISK FACTORS FOR CORDING IN PATIENTS TREATED FOR BREAST CANCER AND AT RISK FOR BREAST CANCER-RELATED LYMPHEDEMA

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Introduction: Cording is a painful and functionally-limiting condition in which visible bands of tissue form in the axilla, arm or trunk following breast cancer (BC) surgery. Its pathophysiology remains somewhat equivocal, and research on its etiology, risk factors and treatment is limited.

Aim: This study aims to identify cording risk factors from demographic and treatment-related data, arm volume changes, symptoms, functional impairments, and quality of life (QOL) issues in a large cohort at risk for BC-related lymphedema (BCRL).

Method: Patients in the Massachusetts General Hospital (MGH) BCRL Screening Program who underwent BC surgery (n=810) filled out a questionnaire regarding cording. Patients reporting that they could see or feel a cord in their axilla, arm, forearm, wrist, or under their breast were assumed to have cording. The survey included questions regarding symptoms (change in arm size/sleeve cuff fit, heaviness, swelling, stiffness, numbness), function (using overhead shelf, pulling on a tight shirt, sleeping on affected side, pulling wet clothes out of the washer, carrying 10 lb. bag over the shoulder, keyboarding), and QOL. Patient demographics (BMI and age at diagnosis), treatment-related data (ALND/SLNB, mastectomy/lumpectomy, positive lymph nodes/none, and reconstruction/none), arm volume and questionnaire responses were analyzed via univariate and multivariate analyses to establish risk factors for cording in this population.

Results: A total of 1531 surveys were completed by 810 patients, 143 of whom had cording (17.7%). Median time to cording onset was 23.7 months post-baseline measurement. Amongst those with cording, 13 (9.1%) and 31 (21.7%) of patients had a relative volume change (RVC) of $\geq 10\%$, and 5- $\leq 10\%$ respectively. On multivariate analysis, patients who underwent ALND (OR 3.56, $p < 0.001$), were < 55 years of age (OR 0.68, $p = 0.060$, borderline significance) or had $RVC \geq 10\%$ were more likely to have cording (OR 2.13, $p = 0.021$). Patients reporting swelling (OR 1.84, $p = 0.003$) or stiffness (OR 1.73, $p = 0.008$) and patients reporting difficulty using an overhead shelf were more likely to have cording (OR 1.48, $p = 0.042$). Quality of life items were not significantly associated with cording on multivariate analysis. In this cohort, 87 patients were seen by a CLT for BCRL, 17 of whom (19.5%) also had cording.

Conclusions: Cording may occur late after BC surgery, or in conjunction with early or progressive BCRL. Patients who undergo ALND, who are < 55 years of age, who report swelling, stiffness or difficulty reaching overhead after BC surgery should be closely monitored for cording and referred for treatment.

[54] BIOIMPEDANCE SPECTROSCOPY AND LIMB VOLUME MEASUREMENT IN THE EARLY DETECTION OF UPPER LIMB LYMPHOEDEMA AFTER AXILLARY NODE CLEARANCE FOR BREAST CANCER.

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Introduction: Lymphoedema of the arm develops after axillary node clearance (ANC) for breast cancer in 20% of women.

Aim: This prospective, multi-centre study compared multi-frequency bioimpedance spectroscopy (BIS) with arm volume measurements by Perometer to determine: 1) which test has better diagnostic accuracy 2) the factors which predict the development of lymphedema.

Method: Participants undergoing ANC were recruited at 9 centres (n=1100). Pre and post-operative arm measurements by Perometry and BIS (L-Dex, Impedimed) were carried out. FACT-B+4 and 2 questions from the LBCQ (lymphoedema breast cancer questionnaire) were completed at each time point.

Lymphoedema was defined as a relative arm volume increase (RAVI) of $> 10\%$ from baseline. A compression sleeve was given to those who developed a $RAVI > 10\%$ and to those who were found to have lymphoedema clinically but with $RAVI < 10\%$.

Predictors of lymphoedema development were determined using logistic regression.

Results: Mean age was 56 (SD ± 12 ; range 22 to 90) years. Lymphoedema was diagnosed in 22.8% of women by $RAVI > 10\%$, but detected in 45.6% by L-Dex (> 10 unit change) by 24 months.

A total of 24.5% received a compression sleeve by 24 months. There was moderate correlation between RAVI and L-Dex at 6 months ($r = 0.62$). For L-Dex > 10 increase at 6 months the sensitivity was 69% (95% CI: 60-84%), specificity of 82% (95% CI: 80-84%). Early changes by 6 months in $RAVI \geq 5$ - $< 10\%$ predicted a 29% risk of lymphoedema by 24 months, whereas $RAVI < 3\%$ by 6 months had a 6% lymphoedema rate by 24 months.

Using multivariable logistic regression, RAVI at 1 month ($p < 0.001$), number of positive lymph nodes at ANC ($p < 0.001$), and prescription of chemotherapy ($p = 0.008$) were independent predictors of lymphoedema ($RAVI > 10\%$) after surgery (from 1 up to 36 months). Patients with lymphoedema ($RAVI > 10\%$) had lower QoL (TOI, total FACT-B, and ARM sub-scale) scores ($p = 0.001$, $p = 0.027$, $p < 0.001$, respectively), than those without.

Conclusions: In this study, limb volume measurement by Perometer was more accurate at predicting the development of lymphoedema (defined by RAVI>10%), than BIS.

RAVI at 1 month, number of positive lymph nodes at ANC and prescription of chemotherapy were independent predictors of lymphoedema.

Reference:

Bundred NJ, Stockton C, Keeley V et al;

Comparison of Multi-frequency Bioimpedance with Perometry for the Early Detection of Lymphoedema after Axillary Node Clearance for Breast Cancer. Breast Cancer Res Treat (2015) 151:121–129

[55] POSTOPERATIVE WEIGHT FLUCTUATIONS MAY INCREASE RISK OF BREAST CANCER RELATED-LYMPHEDEMA

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Introduction: Several risk factors for breast cancer-related lymphedema (BCRL) have been identified and well-studied in recent years. One well known risk factor is an elevated BMI; however, little is known regarding how weight fluctuations throughout and beyond treatment for breast cancer (BC) may impact a patient's risk of developing BCRL.

Aim: The purpose of this study is to evaluate the effects of weight fluctuation on the incidence and severity of lymphedema in a cohort of women treated for BC.

Method: We analyzed data from a large, prospective cohort of women treated for breast cancer who were screened for lymphedema with a perometer measurement pre-operatively and at regular intervals throughout follow-up care. The final cohort consisted of 1596 patients with a total of 7501 measurements. The magnitude of swelling in the extremity at risk for BCRL was calculated using the relative volume change (RVC) formula for unilaterally-affected patients and the weight-adjusted change (WAC) formula for bilaterally-affected patients.

Results: The median follow-up period was 16.4 months and the average number of measurements per patients was 4.8. On univariate analysis, weight fluctuations of $\pm 5\%$, $\pm 10\%$, and $\pm 20\%$ of weight at pre-operative baseline were significant predictors of developing BCRL, defined as an RVC or WAC $\geq 10\%$, for patients with a low baseline BMI ($< 30 \text{ kg/m}^2$) ($\pm 5\%$: OR: 1.66, p -value: < 0.001 ; $\pm 10\%$: OR: 1.79, p -value: < 0.001 ; $\pm 20\%$: OR: 2.21 p -value: 0.007) and a high baseline BMI ($\geq 30 \text{ kg/m}^2$) ($\pm 5\%$: OR: 2.26, p -value: < 0.001 ; $\pm 10\%$: OR: 1.71, p -value: < 0.001). When the entire cohort was analyzed against ALND, RLNR, a high baseline BMI ($\geq 30 \text{ kg/m}^2$), and adjuvant chemotherapy on multivariate analysis, a weight fluctuation of $\pm 5\%$ was significantly associated with developing BCRL (OR: 1.53, p -value: < 0.001). Furthermore, weight loss correlated with BCRL more than weight gain (-5% : OR: 2.49, p -value: < 0.001 ; -10% : OR: 2.86, p -value: < 0.001 ; -20% : OR: 3.35, p -value: < 0.001). Notably, all patients who received adjuvant chemotherapy ($n=784$) experienced their maximum weight fluctuation after the first dose of chemotherapy.

Conclusions: Multivariate analysis of this cohort suggests that a $\pm 5\%$ weight fluctuation from preoperative baseline may influence risk of developing BCRL for patients with both a low and high preoperative BMI. Further, the incidence of BCRL in this cohort was greater among women who lost weight than those who gained weight.

[56] IDENTIFYING RISK FACTORS FOR LOW-VOLUME BREAST CANCER-RELATED LYMPHEDEMA: RESULTS FROM A PROSPECTIVE SCREENING PROGRAM

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Introduction: Several risk factors have been identified as significant predictors for breast cancer-related lymphedema (BCRL), which is commonly defined as a relative volume change (RVC) or weight-adjusted change (WAC) of 10% or greater in the affected upper extremity. Though increased attention to risk factors in conjunction with prospective screening has allowed for earlier detection, it is unclear whether these same risk factors apply to a patient's risk of developing low-volume lymphedema.

Aim: The purpose of this study is to assess which risk factors may be associated with low-volume lymphedema so that methods of BCRL screening and detection may be optimized.

Method: We analyzed data from 2117 women treated for breast cancer who were prospectively screened for BCRL with a perometer measurement and symptoms questionnaires pre-operatively and at regular intervals throughout follow-up. Limb volume changes were calculated using the RVC formula for patients at unilateral risk and the WAC formula for patients at bilateral risk. Linear regression models were applied to elucidate risk factors for developing RVC/WAC 5% to <10%.

Results: In this cohort, 22.1% (468/2117) of patients had a maximum RVC/WAC 5% to <10% and 11.1% (235/2117) had a maximum RVC/WAC ≥10%. On multivariate analysis, history of an RVC/WAC 3% to <5% within the 3 months after breast surgery presented as a significant risk factor for progressing to have a maximum RVC/WAC 5% to <10% at some point throughout follow up care (OR: 2.29, *p*-value: <0.001). History of axillary lymph node dissection (ALND) of eight or more lymph nodes presented as a significant risk factor for progressing to have a maximum RVC/WAC 5% to <10% (OR: 1.46, *p*-value: 0.002) as compared to having ALND with fewer than eight lymph nodes removed. Certain patient-reported symptoms of the affected upper extremity were also associated with having an RVC/WAC 5% to <10% at that time point, including perceived change in arm size (OR: 2.26, *p*-value: <0.001), change in sleeve fit (OR: 1.85, *p*-value: 0.010), perceived swelling (OR: 1.48, *p*-value: 0.030), and aching of the arm (OR: 1.42, *p*-value: 0.038).

Conclusions: Volume changes within the first three months following initial breast surgery may predict progression to BCRL. However, 22.1% patients had a maximum RVC/WAC of 5% to <10% and did not progress to have an RVC/WAC ≥10%. Given the current movement toward early intervention for BCRL, it is imperative to identify patients for whom early intervention is most appropriate.

[57] EARLY COMPRESSION THERAPY AND INDIVIDUALIZED EXERCISE IN WOMEN TREATED FOR GYNECOLOGICAL CANCER: PRELIMINARY FINDINGS OF A PILOT RANDOMIZED CONTROLLED TRIAL

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Introduction: Compression therapy and exercise have been shown to be effective in the management of lymphedema and their early use after cancer treatment may be beneficial in preventing or controlling the development of lymphedema. Currently, there is limited knowledge on effective strategies to reduce the risk of lymphedema, particularly in the gynecological cancer population. Moreover, given the scarcity of research in this area, understanding factors influencing recruitment and attrition to randomized controlled trials may enhance the quality of future studies.

Aim: The objectives of this pilot randomized controlled trial are to evaluate the safety, feasibility and preliminary efficacy of a tailored intervention of early compression therapy with individualized exercise for women treated for gynecological cancer at risk of developing lymphedema. Additionally, we wish to evaluate the feasibility of the study procedures.

Method: Fifty women with newly diagnosed gynecological cancer are recruited pre-operatively from two hospital sites, the McGill University Health Centre Royal Victoria Hospital and the Jewish General Hospital (JGH), located in Montreal, Canada. Study participants are randomized to an intervention group receiving six months of compression therapy and individualized education on exercise or a control group receiving usual care. The following outcome measures are collected at five time points (pre-operatively, 4-6 weeks, 3 months, 6 months and 12 months post-operatively): lower limb circumferential measures (tape measure), volume (perometer), body composition (bioimpedance spectroscopy), presence and characteristics of edema (clinical examination) and quality of life (EORTC QLQ-C30 questionnaire). Safety and feasibility of the intervention are tracked using cellulitis incidence (clinical examination) and adherence to compression (patient diary). In addition, rates of recruitment, attrition, and assessment completion are tracked over the course of the study.

Results: This trial is currently in progress and is scheduled to be completed in April 2019. Of 109 women approached over 30 months, 51 consented to participate in the study (47% recruitment). Reasons for exclusion include declined participation, unmet inclusion criteria and incomplete pre-operative study assessments. Baseline characteristics of the 51 women include a mean age of 59.1 years, with a diagnosis of endometrial (n=33), cervical (n=13) or vulvar (n=5) cancer. Preliminary results will be presented at the conference.

Conclusions: Recruitment to trials exploring intervention strategies in women with gynecological cancer at risk of developing lymphedema is challenging but feasible. This study will provide preliminary information regarding the effectiveness of early compression therapy and individualized exercise in this population.

[58] CHALLENGES IN THE WORLD OF PEDIATRIC LYMPHEDEMA

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Introduction: It is important for caregivers to recognize pediatric lymphedema, and to investigate and treat it appropriately. It is considered a rare 'orphan' affliction with an incidence of 1/6000.

Aim: We wish to share our experience with over one hundred referrals to our lymphedema clinic in the past 10 years and propose a plan for initial investigation and treatment.

Method: We reviewed the charts of the patients and entered data in an excel format.

Results: We had a female predominance of 65.7%. 63.6% were Caucasian, 8% African or Haitian. 20% had congenital onset, and 32% were under the age of 1 year.

We encountered mainly primary more than secondary lymphedema in children. 10% had edema secondary to other causes. Isolated primary lymphedema was seen in 63%. Lower limb involvement was seen in 73%, 19% upper limb, and 3% in genitals. Milroy's was in 7 and Meige in several others. More complex genetic syndromes such as Turners, Tuberous Sclerosis, Phelan McDermid, SOX 18, multisegmental lymphatic dysplasia. Lymphatic malformations accompanied lymphedema in several patients.

Conclusions: Lymphedema in children is commonly due to genetic mutations, and in the primary form is a hypoplastic lymphatic malformation. Treatment is multimodal, with decongestive therapy obtained through short stretch bandages, elastic stockings, and psychologic support to foster self management.

[59] THE CLINICAL AND DEMOGRAPHIC CHARACTERISTICS OF PEDIATRIC LYMPHEDEMA PATIENTS: A MULTICENTER STUDY-PRELIMINARY REPORT

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Introduction: Lymphedema is the chronic, progressive swelling of tissues caused by inadequate lymphatic function. Due to the low awareness about pediatric lymphedema, the patients may be misdiagnosed or late-diagnosed in developing countries. There is no data about Turkish lymphedema children.

Aim: The aim of this study was to evaluate the frequency and characteristics of patients with pediatric lymphedema presented to specific lymphedema units in Turkey, between May 2018-December 2018.

Method: An invitation letter was sent to 10 lymphedema centers in different areas, 8 of them replied but 5 of them reached to the enough number (at least 5 patients) and attended to the study. The demographic, clinical and surgical characteristics of the pediatric patients were determined.

Results: A total of 88 pediatric lymphedema patients were recruited from 5 lymphedema centers which had a total number of 1359 patients (6.5%). 49 (55.7%) of these children were female and 39 (44.3%) were male. The mean age of the patients was 137.0±71.5 months and the mean BMI was 20.8±5.6 kg/m². Of them; 80 patients (90.9%) had primary lymphedema and 9.1% had secondary lymphedema mostly due to childhood syndromes and trauma. 52 children (59%) had grade 2, 30 (34%) had grade 1 and 6 (6.8%) had grade 3 lymphedema. The most common site of lymphedema was lower extremity. 13 children (14.7%) had genital-lymphedema and 4 of them had hydrocele surgery. 13 (14.9%) patients had family history and 5 of them was associated with systemic syndromes and 1 had generalized lymphedema with internal organ involvement. Comorbid disease was lacking in 52 (59.1%) children. The median duration of lymphedema was 41 (2-216) months. The lymphedema stage was reversible in 33.7%, spontaneous irreversible in 64% and elephantiasis in 2.3% of the patients. 53 of the children's caregiver (60%) had not received any information, education and/or therapy for lymphedema.

Conclusions: Although the frequency of pediatric lymphedema is not high in lymphedema units, early diagnosis and treatment is very important in this population. The majority of them had primary lymphedema in the lower extremity. The awareness of lymphedema was low among families. The referring time to lymphedema unit was relatively long and in over half of patients had spontaneous irreversible lymphedema at submission. We suggest educational activities for both families of children with lymphedema and health care providers, in order to facilitate early reference to lymphedema units and to perform prompt preventive and therapeutic approaches for this suffering condition.

[60] LYMPHOEDEMA NETWORK WALES CHILDREN AND YOUNG ADULT'S SERVICE AUDIT

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Introduction: Lymphoedema Network Wales established a lymphoedema service for 'Children and Young Adults' in November 2015. The National Paediatric Lymphoedema Specialist for Wales supports local assessment and treatment of people's lymphoedema, thus negating the need for excessive travel for patients and their families. This specialist also provides clinical supervision and training for lymphoedema staff in Wales.

Aim: To determine the 'Children and Young Adults Lymphoedema Service for Wales' activity and the value of this service to these patients and the NHS.

Method: An audit of the service from inception up until end December 2018 was undertaken. Data was evaluated using Descriptive Statistics from SPSS statistics version 25.

Results: The database logged 286 patients, 200 were on the current caseload, 79 had been discharged and seven patient were waiting to be assessed. The average number of days a patient had to wait before being seen was 17.1 days (range 0-187 days). The average age was 15.4 years (0-31 years old), with most of the patients referred being aged 20 years or older (n=96), and decreasing in age groups to the lowest number of patients in the 0-4 year old (n=27) group. The age of onset of lymphoedema ranged from 0 to 24 years, with the average age of onset of lymphoedema being 8.5 years old. The type of lymphoedema demonstrated 49% Primary, 2.4% Secondary to Cancer, 39.2% Secondary to Non-Cancer, and 9.4% were not seen.

The BMI taken showed 19.5% as underweight or normal weight, 11.2% Pre-obese and 13.5% were obese. The remaining people either too young (17.5%) wheelchair bound (8.7%), indeterminable (4.2%) or were not taken (21.6%). The number of patients who had cellulitis prior to their first assessment was 34, which has reduced to 10 episodes since treatment commenced, an improvement of 70.6%. The number of hospital admissions prior to first assessment was 41, which reduced to 4 since commencement of treatment, an improvement of 90.2%. Patient-reported outcome measures (PROMs) scores significantly reduced from the first assessment (average score reduced from 22.4 to 7.1) with swelling and pain being reported the most problematic.

Conclusions: The introduction of the 'Children and Young Adults Lymphoedema Service' in Wales has provided demographics of this cohort of people in Wales. It illustrates the value of this service to the NHS and service users in terms of reduction of cellulitis episodes.

[61] THE USE OF LYMPHOSCINTIGRAPHY IN THE INVESTIGATION OF PEDIATRIC LYMPHEDEMACatherine McCuaig¹, Sophie Turpin², Raymond Lambert²¹ Chu Sainte-Justine, Pediatrics, Dermatology Service, Montreal, Canada² Chu Sainte-Justine, University of Montreal, Nuclear Medicine, Montreal, Canada**Introduction:** Identify children with lymphedema as cause of limb edema**Aim:** Describe the lymphoscintigraphic patterns in congenital lymphedema, lymphedema praecox and secondary lymphedema**Method:** 54 studies were reviewed in 50 patients
16 boys aged 7 months to 15 years (5.4 ± 7 years)
3 girls aged 1 month to 19 years (12.6 ± 4.5 years)

In each the following technique was performed: Lymphoscintigraphy by Interdigital injection of Filtered Technetium 99m sulfur colloid in the affected and contralateral feet and/or hands and sequential imaging at 1 hour with delay after walking/massaging at 3h +/- 6h +/- 24 h PI

Results: We identified 9 patients with edema not due to lymphedema: Congenital hemihyperplasia syndrome (3) Post phlebotic syndrome (1), Linear scleroderma (1), Spontaneous resolution (2), Muscular asymmetry (1), Thoracic lymphangiomatosis (1)
In those with Congenital Lymphedema, 6 boys and 3 girls, Aged 1 month to 15 years old (5.9 ± 5.5 years old) 3 patients with Milroy's disease and one patient with Turner's disease. Bilateral disease in 5 patients and Unilateral disease in 4 patients.
Praecox Lymphedema was seen in 4 boys and 19 girls aged 4 to 18 years old
Secondary Lymphedema was seen in 1 boy and 7 girls, Aged 11 to 19 years old: 2 post radiotherapy, 2 post trauma, 4 post venous thrombosis
Dermal back flow Observed in lower extremities only, was seen in 13 studies; 2 congenital lymphedema 7 lymphedema praecox 4 secondary lymphedema
In congenital Lymphedema:

BILATERAL LYMPHEDEMA (10)	
APLASIA	5
HYPOPLASIA	3
NORMAL	2
UNILATERAL LYMPHEDEMA (6)	
APLASIA	2
HYPOPLASIA	2
NORMAL	1

Conclusions: Lymphoscintigraphy is technically feasible in the vast majority of patients
Aplasia: more common in congenital lymphedema
Hypoplasia: more common in lymphedema praecox or secondary lymphedema
We will discuss the place of Lymphoscintigraphy in the investigation of vascular anomalies, and compare to other investigational modalities time permitting.**[62] AMERICAN LYMPHEDEMA FRAMEWORK PROJECT (ALFP) SURVEY OF LYMPHEDEMA THERAPISTS: A 2018 UPDATE**Elizabeth Anderson¹, Allison Anbari¹, Nathan Armer¹, Jane Armer¹¹ University of Missouri, Sinclair School of Nursing, Columbia, United States**Introduction:** Lymphedema can occur following underdevelopment or interruption of the lymph system anywhere in the body. Most commonly, it is a sequela of cancer treatments and may affect the approximately 15.5 million cancer survivors living in the United States (U.S.). Once developed, this condition requires both professional and self-care to maintain limb function and quality of life. With cancer survivors increasing in number, lymphedema rehabilitation and management is critical. The importance of trained lymphedema therapists in symptom management and rehabilitation has been increasingly recognized in the literature.**Aim:** In 2009, lymphedema therapists in the U.S. were surveyed to describe their preparation, their patient population, and how they cared for patients (N=415; Armer et al., 2010). In Fall 2018, we sought to determine how demographics, practice settings, and care modalities of current U.S. therapists changed, as well as determine current practice challenges. In addition, we deliberately expanded the reach of the survey to trained lymphedema therapists around the world.**Method:** The 2009 American Lymphedema Framework Project Lymphedema Therapist Survey was updated and distributed via Qualtrics to lymphedema therapists in the U.S. and worldwide over an 8-week period. Some 947 completed surveys were received and included in the current analysis. Therapist demographic information, educational background, practice setting, treatment modalities, patient characteristics, referral methods, assessment and measurement methods, and patient educational resources were queried.**Results:** Preliminary results showed these participant characteristics: country: U.S. (n=672/922 [73%]); Canada (n=92[10%]); United Kingdom (n=42[5%]); Australia (n=28[3%]); gender: identifying as female (n=633/676 [93%]); mean age: 47yrs (range 21-76); discipline (top 3): PT [45%], OT [31%], MT [24%]); mean practice years: 10.7yrs (range 0-41); and practice setting (top 4): hospital out-patient clinic (47%); private practice (38%); hospital in-patient (13%); home care/hospice (9%). Descriptive-comparative analyses were performed to compare 2009 and 2018 findings. Further 2018 comparative analyses will be shared.**Conclusions:** Lymphedema therapists are critical members of the health care team providing care to persons with and at risk of lymphedema from all causes. Understanding the characteristics and practices of lymphedema therapists and their patients will help health professionals, educators, policy-makers, and funders better meet the under- and unmet needs of this population.**Reference:** Armer, J. A., Paskett, E. D., Fu, M. R., Feldman, J. L., Shook, R. P., Schneider, M. K., Stewart, B. R., & Cormier, J. N. (2010). A survey of lymphoedema practitioners across the US. *Journal of Lymphoedema*, 5(2), 95-97.

[63] 2009-2019: A DECADE OF MAKING A DIFFERENCE IN THE CANADIAN LYMPHEDEMA COMMUNITY

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¹ Canadian Lymphedema Framework, Canada

Introduction: The Canadian Lymphedema Framework (CLF) is an academic and patient stakeholder collaboration that is part of an international initiative promoting worldwide lymphedema research, best practices and clinical development. The CLF is modelled on, and has a partnership with, the International Lymphoedema Framework, and links with other national frameworks and regional lymphedema associations in Canada to achieve its goals.

Aim: The Canadian lymphedema community has seen many positive changes in the last ten years. In celebration of its 10th anniversary, this presentation (poster or oral) will demonstrate the contributions that the CLF has made since its inception a decade ago, in advancing lymphedema care in Canada.

Method: Starting with an open space stakeholder meeting (2009), 100 stakeholders from across Canada prioritized the work to be done into three areas of focus; Education/Awareness, Research and Partnerships. To this day, these same pillars guide the CLF Board in setting annual strategies, projects and activities. Some of those are listed below.

Results:**Education and Awareness tools**

- Comprehensive website with over 100 pages of content
- GP card (*6 Things Physicians Should Know*) distributed to every physician in Canada
- Patient education materials: pamphlet and booklet (French and English)
- National conferences (2009, 2011, 2013, 2015, 2017, 2019)
- Media: Toronto Train Station/Metro billboards showcasing chronic swelling
- Media collaboration with actress Kathy Bates profiling her personal lymphedema story
- *Pathways* magazine (Summer 2019 issue marks its 8th year and 30th issue)
- Consensus document on Training Standards for lymphedema therapists
- 2019 Calendar featuring inspirational patient stories promoting self management
- Health Professionals Toolkit - supporting clinical practise

Research and publications

- Hosted stakeholder meeting - establishing Canadian priorities
- Produced Lymphedema Landscape Study - identifying educational gaps
- Conducted Delphi study - setting the National Research Agenda for Canada
- Published two repositories of Canadian lymphedema related research
- Determined Canadian lymphedema prevalence estimates
- Conducted Reimbursement Survey, - highlighting inequities in access to care
- Promoted research at national conferences showcasing abstract submissions
- Participated in ILF LIMPRINT and Outcome Measures projects

Partnerships

- Collaboration with ILF - sitting on their Board and co-hosting 2011 ILF conference
- Hosting quarterly cross Canada calls - connecting nine regional associations
- Industry collaboration - 3M (Landscape Study), Valco (inspirational calendar) and BSN (educational webinars)

Conclusion: As a charitable organization, the Canadian Lymphedema Framework is still in its infancy. However with hard working volunteers, strong partnerships and industry support, it has become a credible and reputable association - establishing one strong voice for lymphedema in Canada.

[64] SHAPING LYMPHOEDEMA RESEARCH IN THE UK: A BRITISH LYMPHOLOGY SOCIETY SCIENTIFIC COMMITTEE INITIATIVE

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Introduction: The British Lymphology Society Scientific Committee (BLSSC) recognises that to improve the evidence base for the treatment and management of lymphoedema further research is needed and this research needs to be embedded into clinical practice. This presentation describes the BLSSC's innovative approach to shape the research agenda in the UK.

Aim: To encourage research appreciation and activity amongst the BLS membership in order to improve the evidence base for lymphoedema treatment and management.

Method: A range of approaches has been utilised including:

- A collaborative, national research prioritisation study to identify the top 10 research priorities for lymphoedema management in the UK from the perspective of patient's, carers and clinicians to identify and drive action towards meaningful research [1].
- The top 10 research priorities have been adopted as the BLSSC's research priorities and aligned to its Lymphoedema Research Grant (LRG), with the aim of promoting research into these areas.
- The BLSSC aim to support novice researchers through seeding grants and expert critical appraisal of research grant applications.
- Promoting British Lymphology Society (BLS) members' research activities in the BLS newsletter.
- Providing a platform for experienced researchers at the annual conference and actively encouraging novice members to participate in research by supporting presentations and a specific novice oral and poster presenter award.
- Using the BLS newsletter as a research education tool for the membership with the aims of embedding research into clinical practice.
- Facilitating skills development with an honorary position on the BLSSC to develop the novice researchers' skills through mentorship.

Conclusions: The aims of the BLSSC are to encourage and promote research into lymphoedema treatment and management in the UK. The research prioritisation collaboration has allowed the BLSSC to focus on the research that is important to those living with lymphoedema and together with the BLSSC's initiatives to nurture novice researchers we hope to improve both the research landscape and ultimately the management of lymphoedema in the UK.

[65] POSSIBLE RISK FACTORS FOR CELLULITIS EXPERIENCE IN LYMPHOEDEMA PATIENTS IN JAPAN: SECONDARY ANALYSIS USING NATIONAL LIMPRINT DATABASE

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Introduction: Many risk factors for cellulitis in lymphoedema patients have been reported, however, there is limited information in Japanese population. Targeting high-risk individuals will provide efficient preventive strategy for cellulitis in lymphoedema patients.

Aim: The purpose of this study was to clarify the details for patient and wound characteristics and the risk factors for presence of cellulitis history in Japan.

Method: This study was a secondary analysis of LIMPRINT (Lymphoedema IMPact and PRevalence – INTernational) study using national database collected in the adult population in Japan between 2014 and 2015 including six institutions (N=113). Descriptive data were collected for patient and wound characteristics. Logistic regression analysis was conducted to explore the possible risk factors for presence of cellulitis history.

Results: The duration of oedema ranged from <6 months (16.2%) to 10 years or longer (25.2%) with various severity. Prevalence of cellulitis history was 31.9%. Prevalent categories of treatment within complex decongestive therapy included skin care advice (52.2%), compression garment (55.8%), exercise advice (41.6%), multilayer bandage (38.1%), cellulitis advice (49.6%), and massage (61.1%). Access to lymphoedema specialist was possible for 57.1% of the patients. Wounds are present in 50.4% of patients. The most prevalent site for the wound was abdomen (64.9%) and the most prevalent wound type was surgical wound (closed) (91.1%) with wound duration of 5 years or longer (79.3%). Only five patients had an active wound. Longer duration of lymphoedema (OR=3.49), access to lymphoedema specialist (OR=0.32), and presence of wound (OR=3.17) were significantly associated with cellulitis history in this population.

Conclusions: Having the closed surgical wound in the abdomen with longer duration may be a risk factor. It is noteworthy to state that accessing to lymphoedema specialist prevented having cellulitis. Focusing on the lymphoedema patients who have closed surgical wound and have difficulty in accessing the lymphoedema specialist might be a efficient strategy to prevent cellulitis in Japanese population.

[66] OPPORTUNITIES AND CHALLENGES OF PERFORMING ON-SITE HUMAN SUBJECTS RESEARCH AT PATIENT-FRIENDLY MEDICAL CONFERENCESPolly Armour¹, Karen Herbst²¹ University of Arizona, Department of Medicine, Tucson, United States² University of Arizona College of Medicine, Treat Program, Tucson, United States

Introduction: Conducting human subject research has many challenges; one of the biggest is finding adequate numbers of volunteers. Potential volunteers may not be aware of research opportunities, or may be unable to commit to multiple visits. Traveling long distances can be challenging, especially for those with limited mobility, such as with advanced lipedema or lymphedema.

Aim: To discuss our experience conducting on-site research at an annual medical conference for people with fat disorders.

Method: The Fat Disorders Resource Society (FDRS) was founded in 2009; its mission includes improving the quality of life for all people affected by fat disorders by supporting research, education, advocacy, and collaboration. Their annual conference draws several hundred attendees, including patients with lipedema and Dercum's disease, surgeons, clinicians, therapists, vendors, and advocates.

At the 2017 and 2018 FDRS conferences (in Salt Lake City and Dallas, respectively) researchers from the University of Arizona and Vanderbilt University conducted research with attendees following appropriate consent and protocols approved by each institution's IRB. In 2017, data collected included physical exam, questionnaire, temporo-spatial parameters of gait, body leg and trunk width and circumference, muscle strength, tissue dielectric constant, and measures of tissue fibrosis and elasticity. In 2018, data collected included physical exam, questionnaire, segmental bioimpedance, tissue dielectric constant, digit ratio, 3D imaging, pulse volume, glycocalyx measurement, ultrasound and photography. In 2018, an exit survey captured participants' feedback regarding their experience.

Results: The response from the attendees of each conference was incredible – 85 participated in 2017, and more than 100 in 2018. In the words of one researcher, "We collected more data in one weekend than we could have in a year at our clinic." Patients were eager to contribute, and some waited several hours for their turn. Feedback indicated most participants were satisfied or extremely satisfied with their research experience.

On-site research opportunities:

- Large number of potential research volunteers in one place
- Time-efficient means to collect a large amount of data

On-site research challenges:

- Recruitment of controls can be difficult
- Regulatory challenges: Coordination among research institutions, conference organizers, and IRBs; maintaining participant privacy in a conference setting; insurance coverage
- Logistical challenges: Research room layout, staffing, participant time and flow
- Managing bias inherent in a convenience sample.

Conclusions: Patient conferences are a viable opportunity to perform human subject research. They are not without constraints, but the opportunities outweigh the challenges.

[67] A STANDARDIZED AND TRANSPARENT APPROACH TO DEVELOPING CLINICALLY-RELEVANT PRACTICE GUIDELINES FOR PERSONS AT RISK OF AND WITH LYMPHEDEMAAllison Anbari¹, Pamela Ginex², Rebecca Morgan³, Jane Armer¹¹ University of Missouri, Sinclair School of Nursing, Columbia, United States² Oncology Nursing Society, Pittsburgh, United States³ McMaster University, Health Sciences Centre, Department of Health Research Methods, Evidence, and Impact, Hamilton, Canada

Introduction: Lymphedema is a side effect of cancer treatment that ranges from reversible and treatable to severe and chronic. Incidence of lymphedema varies greatly, however, patients remain at risk for life. Persons who experience lymphedema may have long-term consequences that impact their quality of life and functional capacity.

Evidence-based practices and guidelines have become standard in health care. Health care professionals are expected to use the best evidence to guide practice, but have limited time, resources, and/or skills to access and evaluate the quality of research evidence. Rigorously-developed and transparent clinical practice guidelines can assist practitioners with decisions about appropriate healthcare interventions, thereby reducing variations in practice, while promoting high-quality care.

Aim: The purpose of this project was to develop transparent, rigorous, and clinically-relevant symptom management guidelines for the surveillance, risk-reduction, and treatment of cancer-related lymphedema using a standardized methodological approach.

Method: The Oncology Nursing Society convened a multidisciplinary panel of clinical and research experts in lymphedema management. The panel also included a patient advocate and guideline methodologist. The panel met bi-weekly to identify and refine clinical questions to focus the guideline. The panel followed the GRADE (Grading of Recommendations for Assessment, Development, and Evaluation) approach for evidence assessment and guideline development.

Results: The Guideline Panel developed three primary groups of PICO (Population, Intervention, Comparison, Outcome) questions: 1) Strategies for prospective surveillance of patients at risk for lymphedema; 2) Risk-reduction interventions for prevention of lymphedema; and 3) Treatment interventions for lymphedema. Systematic reviews will be conducted for each of the questions. The panel that is conducting the systematic review is separate from the guideline panel to maintain objectivity of the recommendations. At the completion of the systematic review, the guideline panel will convene in person to make recommendations based on the synthesis of the evidence from the systematic review. Full results of the guideline panel will be presented. The process of producing these rigorously-developed, clinically-relevant, transparent practice guidelines will provide an exemplar of the systematic review and evidence-based practice recommendations for lymphedema for oncology and other patient populations.

Conclusions: Care of patients at risk for or experiencing lymphedema can be improved by the use of rigorous evidence-based guidelines. The process undertaken to develop these lymphedema guidelines is a model for multidisciplinary collaboration that results in clinically-relevant questions and recommendations with the ultimate goal of improving care for persons at risk for or experiencing lymphedema.

[68] KNOWLEDGE OF THE LYMPHATIC SYSTEM AND OF EFFECTIVE SELF-MLD

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Introduction: The Swedish Association of Chronic Oedema (Svenska Ödemförbundet, SÖF) has as an objective to educate our members and the health care profession about the lymphatic system and how to learn to control their chronic oedema (live lympho-logically). The knowledge of lymphoedema is scarce in the health care system and in the public. As long as the health care profession lacks knowledge about the lymphatic system and the syndroms of lymphoedema the patients will not be able to learn about their own condition and how to handle it.

Aim: SÖF's aim is to inform the health care profession and the paramedics about the lymphatic system and how to teach students in lymphology and lymphatic management and patients how to learn to live lympho-logically by self-management including self-MLD. We strive to facilitate for members all over Sweden to live with the condition of chronic oedema whether it is lymphoedema, lipoedema, Dercum's disease or venous oedema.

Method: Margareta Haag and Helena Janlöv Remnerud wrote the manuscript for two films; one film about the lymphatic system and one film where the lymph therapist describes very clearly how to do self-MLD together with a patient/member. SÖF is always working in collaboration with a lymph therapist to make them understand the patient's perspective and preferences and to make the patient understand the importance of certain movements and what actually helps to increase the lymph flow.

Results: The films were linked on the youtube-channel of Svenska Ödemförbundet in the beginning of 2018 and announced on our website, on our social media platform, in our Newsletter and in our journal Lymfan. We have used the film at meetings with lymph therapists and health care professionals and at meetings with members. The films have been a success and members are pleased to be able to learn about the lymphatic system and movements to increase the lymphatic flow.

Conclusions: The films have been shown in the Nordic Patient Council of lymphoedema and lipoedema (patient associations in Denmark, Faroe Islands, Norway and Sweden) and are being translated to the Nordic languages. The films could be used by ILF on the website and may be of assistance to paramedical students and to persons with lymphoedema, lipoedema, Dercum's disease and venous oedema. We would like to show the films at the ILF-Conference in Chicago, 13 – 15 June, 2019.

[69] PROFESSIONAL GUIDE TO COMPRESSION GARMENT SELECTION - TAKING COMPRESSION GARMENT PRESCRIPTION IN S.T.R.I.D.E. (AN ALGORITHM INCORPORATING BOTH TEXTILE CHARACTERISTIC AND EDEMA PRESENTATION TO OPTIMIZE MEDICAL COMPRESSION GARMENT SELECTION)

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Introduction: The effectiveness of a compression garment (Medical Compression Stocking - MCS or Adjustable Wrap - AW) is dependent on dose (mmHg) as well as the physical and dynamic properties of the textile, including elasticity and stiffness. Transparency with regards to the comprehensive compression profile is needed to make an appropriate MCS/AW selection. In addition, there are patient specific characteristics (tissue texture, limb size, location of swelling, quality of edema, patient functional level) that have clinical relevance on compression garment selection.

Aim: Selection of the appropriate compression garment necessitates matching compression garment to the patient presentation and abilities. Clinicians need to evaluate the location and quality of the edema and the functional abilities of the patient; in addition, the specific physical properties of the compression textile need to also be examined. S.T.R.I.D.E.™ (Shape, Texture, Refill, Issues, Dosage, Etiology) is an algorithm that combines evidence-based compression recommendation with clinical expertise to assist the clinician with appropriate compression garment selection

Method: Review of the literature reveals there is a vast difference among compression products even within an individual compression class or style of garment¹⁻⁴. Utilizing S.T.R.I.D.E.™, the authors will demonstrate steps to appropriate garment selection. Specific patient characteristics will be matched to a compression textile, garment design, compression dosage and physical ability. Case examples will demonstrate interphase pressure measurements (mmHg) and volume measurements (cm³) at the time of prescription and upon follow-up to demonstrate appropriate garment selection.

Results: Utilizing S.T.R.I.D.E.™ individual edema characteristics, tissue type and physical ability of the patients were matched to a specific compression garment choice. In each of the cases presented, the specified dosage was observed, and the volume of the limb was maintained at one- and two-week follow-up. Compression garment selection requires a comprehensive assessment of etiology and presentation of the edema, the abilities of the patient and the dynamic performance of the compression textile.

Conclusions: S.T.R.I.D.E.™ compression garment selection algorithm is a practical, evidence based clinical tool to assist healthcare providers with effective compression garment prescription.

[P1] NUTRITION GUIDELINES FOR THE MANAGEMENT OF LYMPHEDEMAJean LaMantia¹¹ Markham Lymphatic Centre, Toronto, Canada

Introduction: There are currently no established dietary recommendations for the nutritional management of lymphedema. Neither of the two major English language databases for nutrition professionals, PEN®* or Eat Right Pro®, contain guidance in the area of lymphedema. Since liver and intestinal lymphatics generate approximately 80% of the body's lymph (1), and the liver and intestines have a dominant role in the digestion, absorption and processing of nutrients, this would infer that diet has the potential to impact the development of lymph and the management of lymphedema.

Aim: To determine the best practices for the nutritional management of lymphedema.

Method: A thorough research review was conducted using PubMed. The resulting research was analyzed according to the PEN® Evidence Grading Checklist and main themes were identified and described. Where no research exists, standard practice that has been described from reputable lymphedema organizations were adopted and nutrition strategies were proposed based on an understanding of lymphatic physiology.

Results: The literature review yielded results and identified the following main themes: weight management, low-salt diet, low fat diet, and restricted long-chain fatty acids with replacement by medium chain triglyceride. In the absence of supporting evidence, standard practices cited by lymphedema organizations discourage fluid and protein restrictions. While time-restricted feeding, anti-inflammatory diet and management of bowel regularity lack specific research, these strategies are recommended on the basis of an understanding of lymphatic physiology.

Conclusions: Nutrition therapy does appear to have a place in the treatment of individuals with lymphedema. Based on this review, the best dietary approach for a nutrition strategy in the management of lymphedema consists of: 1) achieving and maintaining an ideal body weight, 2) sodium restriction, 3) sufficient fluid and protein to meet RDI, 4) low fat with possible inclusion of MCT oil, 5) anti-inflammatory diet, 6) nutrition and exercise strategies to promote bowel regularity and 7) the possible use of time-restricted feeding. These nutrition strategies could be offered to individuals with lymphedema to complement but not replace physical therapies. These strategies should be tested in clinical trials to determine the best nutrition plan for the management of lymphedema.

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*PEN® is currently updating their pathways to incorporate information from this review into their database.

[P2] LYMPHOEDEMA MANAGEMENT ACTIVITY IN URBAN AREA, TANZANIACecilia Uisso¹, wilfred mandara², upendo mwingira³¹ Nimr-Tanzania, Director of Research and Coordination Program, Dar Es Salaam, Tanzania² Nimr, Dr, Dar Es Salaam, Tanzania³ Nimr, Dr, Dar Es Salaam, Tanzania

Introduction: Lymphatic filariasis (LF), caused by *Wucheria bancrofti*, is a leading cause of morbidity in Tanzania. Tanzania have started to implement Lymphoedema Management training in urban area based on WHO guidelines with the aim of achieving GET 2020 goals. One of the WHO component of the global programme is to alleviate suffering through morbidity management and disability prevention (MMDP). It is estimated that 10,000 individuals have lymphoedema in Tanzania. Since May, 2017 Lymphoedema management training was introduced, targeted community health workers and lymphoedema patients to train them on how to reduce the suffering for the affected people with Lymphoedema in Dar es Salaam region.

Aim: The objective was to train health workers on clinical aspects of lymphoedema Management and Lymphoedema patients on self-care management.

Method: Health workers to identify the Lymphoedema patients and bring them for training. Training is conducted within the endemic district where most of the patients are coming from so as to reduce the distance for the patients and encourage more people to attend training. Supervision and Monitoring to trained health workers practices in patient's identification and follow up, and also to Trained patients on how do they practice self-care.

Results: A total of 186 Health workers and Lymphoedema patients were trained in 2018, Lymphoedema patients being 88 and 98 health workers were trained from all districts of Dar es Salaam region

Conclusions: Lymphoedema management training is very crucial to both Health workers and Lymphoedema Patients whereby it helps the patients not to feel that they are neglected. Wash kits are given during the training which help patients to practice self-care.

[P3] CAN TDC (TISSUE DIELECTRIC CONSTANT) MEASUREMENTS BE USED TO DETECT EDEMA / DERMAL FLUID IN LIPOEDEMA PATIENTS

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Introduction: According to the Dutch Guidelines Lipoedema 1, lipedema doesn't show any signs of classic interstitial edema in stage 1,2 and 3. The use of tissue dielectric constant (TDC) allows for the measurement of superficial fluid. The LymphScanner consists of an electronic control unit and an integrated probe to measure the tissue dielectric constant (TDC) of the measurement site.

Aim: To identify tissue fluid in arms, upper and lower legs and hips in lipedema patients. To compare the tissue fluid outcomes.

Method: An assessment tool was developed to establish the type of edema, investigating whether patients are using medication, have venous insufficiency, heart failure, thyroid or kidney problems, had a liposuction etc. We used clinical investigation to determine what stage and type of lipedema the patients at. We measured specific measuring points with TDC. These measurements were compared to the normal skin fluid of each patient. Research done by Mayrovitz² what 'normal' tissue fluid margins are in healthy people. We also used research of TDC in lipedema patients done by Wigg and Lee³

Results: 120 lipedema patients will be measured and clinically assessed. At this moment the study and its conclusions aren't finished. We're not able to give the exact results in this stage of the study yet. The early results demonstrate that TDC is a useful tool to identify edema in lipedema patients.

Conclusions: We foresee outcomes of TDC measurements in lipedema patients in arm, hip, lower- and upper leg between 38% and 45% and in lipedema patients with a fluid component in the skin more than 45%

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 2. Mayrovitz et al (2012) bookchapter In: Lymphedema: Presentation, Diagnosis, and Treatment Arin K. Greene, MD, MMSc, Håkan Brorson, MD, PhD, and Sumner A. Slavin, MD. Section 3 Diagnosis of Lymphedema
 3. Wigg and Lee (2015) BLS conference, Birmingham, 4-6th October, 2015

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[P4] SCALING UP TREATMENT OF CHRONIC LYMPHEDEMA SECONDARY TO WUCHERERIA BANCROFTI INFECTION IN TANZANIA.

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Introduction: It is estimated that over 300,000 people in Tanzania are suffering from chronic lymphedema secondary to being infected with *Wuchereria bancrofti*¹. Sanitas Hospital located in Dar es Salaam, Tanzania coordinates a multidisciplinary program aimed at up-scaling treatment for those suffering with this debilitating disease.

Aim: To outline the current state of lymphatic filariasis management in Tanzania. To describe the components of our lymphedema management program. To share our experience of training other healthcare facilities in utilizing the best practice methods we have identified. To highlight the key challenges to the up-scaling of treatment. Finally, to discuss possible solutions and the way forward.

Method: The lymphedema program was evaluated through the use of chart review, patient/ key stakeholder interviews and from post-training written surveys.

Results: Since February 19, 2017, seventeen patients with chronic lymphedema have been cared for. Twenty four healthcare providers from three separate healthcare facilities have been trained. The lack of compression bandages and compression garments were identified as the major challenge to up-scaling treatment.

Conclusions: Tanzania, through the efforts of the national Mass Drug Administration Program (MDA), has made great strides in reducing the transmission rate of *Wuchereria bancrofti*. However, more effort is needed for those who already suffer with the chronic manifestations of lymphatic filariasis. Multidisciplinary lymphedema programs are in great need. More trained healthcare providers are needed urgently. A solution is needed to solve the problem of securing a steady supply of compression bandages as well as compression garments. The latter is the key to the way forward.

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[P5] USEFULNESS OF FUNCTIONAL ASSESSMENT OF POST-MASTECTOMY PATIENTS QUALIFIED FOR BREAST RECONSTRUCTION PROCEDURE USING PATIENTS OWN TISSUE- A PRELIMINARY REPORT.

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Introduction: Breast cancer is a medical problem but also – since it is women who suffer from it most frequently – an aesthetical and psychological one. Contemporary breast cancer treatment is less and less maiming, but it nonetheless lasts for long periods and has numerous side-effects. Whenever possible, the breast should be reconstructed using autologous tissue, and the procedure should be conducted as soon as possible. The procedure should ensure the best possible not only aesthetical but also functional result because that due to the breast amputation and limited mobility of the upper limb, body statics become disrupted. Due to the possible occurrence of functional limitations the implementation of a functional assessment of patients after a delayed procedure using LDF as a part of comprehensive and interdisciplinary treatment seems necessary.

Aim: A functional assessment of post-mastectomy patients who underwent latissimus dorsi breast reconstruction and of healthy women, through an analysis of selected muscle function parameters

Method: The tests concerned 20 participants. 10 of whom patients who surgery due to breast cancer and an autologous delayed latissimus dorsi breast reconstruction procedure. , and 10 of whom consisted of healthy and professionally active women who did not undergo any surgery and were not diagnosed with cancer(control). The tests were conducted once, within a year of the reconstruction procedure.

The research consisted of two tests: an assessment with a DASH questionnaire and a physical examination (of shoulder area static assessment, shoulder complex mobility assessment, latissimus dorsi flexibility assessment, and shoulder complex motor control assessment).

Results: LDBR procedure may have influence on limiting shoulder complex active mobility as well as on shoulder complex motor and postural control decrease. Quality of life after delayed LDBR procedure, can be conducted by patients on a significantly lower level. Properly conducted functional assessment and implementing correct physiotherapy should lead to elimination or minimalization of the upper limb and shoulder complex disability after the procedure.

Conclusions: Research results point to the necessity of conducting functional assessment of post-mastectomy patients qualified for LDBR procedure on a larger number of patients in order to create a physiotherapeutic algorithm taking into account a comprehensive attitude towards the treatment and exchange experience. Providing patients with comprehensive information on the possibility of the occurrence of functional limitations after the procedure and the necessity of intense post-operative physiotherapy implementation before the procedure seems necessary.

[P6] IMPACT OF BREAST CANCER-RELATED LYMPHEDEMA ON SURVIVORS' RETURN TO WORK AND QUALITY OF LIFE IN GHANA

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Introduction: Breast cancer-related lymphedema (BCRL) is one of the most significant sequelae following breast cancer treatment. The reported incidence of BCRL ranges from 5%-60% and it is estimated that approximately 20 to 40 percent of the women who undergo breast cancer treatment may experience BCRL in their lifetimes. Little research has examined the impact of BCRL on return to work worldwide, nor is such research reported in Ghana, specifically.

Aim: The aim of this study was to describe how BCRL influences work experiences and quality of life among breast cancer survivors living in Ghana.

Research questions included:

Among breast cancer survivors with BCRL living in Ghana,

- How does BCRL affect return to work?
- How does living with BCRL impact overall quality of life?

Method: A single- and multiple-case study methodology was used to explore the impact BCRL has on survivors' ability to return to work and overall quality of life in Ghana. Inclusion criteria were women who: (1) were residents of Ghana; (2) were diagnosed with breast cancer ≥12 months ago; (3) were diagnosed with BCRL; and (4) returned to work after BCRL was diagnosed. Purposive sampling was used to select participants. An investigator-developed survey was used to collect demographic and clinical background information; the Medical Outcomes Study (MOS) 36-Item Short Form Health Survey (SF-36) was used to collect health and quality of life data; and a one-hour semi-structured, digitally-recorded interview elicited data on return-to-work experiences and perspectives. Final reflections on the experience of living with BCRL and what was learned in the process were also captured. Using the research questions as theoretical propositions, patterns in the case study were identified and grouped into themes. Here findings of a single case-study are presented.

Results: Emerging themes from the data were: (1) negative impact of BCRL on the survivorship work experience; (2) decreased quality of life, including physical and emotional/psychological consequences of BCRL and low self-confidence and self-esteem; and (3) low level of BCRL awareness among clinicians and society.

Conclusions: BCRL negatively impacts the life of the breast cancer survivor living and working in Ghana, mirroring the impact documented in other parts of the world. Therefore, more professional and public awareness needs to be created to help increase understanding and reduce BCRL impact.

[P7] THE INFLUENCE OF BREAST CANCER-RELATED LYMPHEDEMA ON SURVIVORS' RETURN-TO-WORK

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Introduction: Breast cancer-related Lymphedema (BCRL) is one of the major treatment complications for survivors who have undergone axillary lymph node dissection and radiation. As the majority of women who develop breast cancer are at the age of employment, occupational functioning and employment are issues of concern. This study is novel in exploring the ways that lymphedema affects their work.

Aim: The primary specific aim of this study was to examine the ways that BCRL influences the individual's work experience. The secondary aim of this study was to investigate the influences of contextual factors (personal and environmental) on survivors with BCRL, as they return to work.

Method: The International Classification of Functioning, Disability, and Health (ICF) was employed as an organizing framework for our inquiry. A multiple-case study methodology drawn from Yin's (2014) definition was employed. Breast cancer survivors who finished primary treatment (surgery, radiation) more than 12 months prior to study, and were diagnosed with lymphedema and employed at the time of diagnosis were recruited. Thirteen female breast cancer survivors who developed BCRL participated by completing a survey and a sixty-minute semi-structured interview. Constant-comparative data analysis was employed in both within-case and across-case analysis.

Results: Four main themes emerged: 1) BCRL affects physical and emotional functioning associated with work; 2) Ongoing treatment (e.g., bandages) for BCRL creates challenges for work; 3) Environmental factors affect the return-to-work experience with BCRL; and 4) Personal factors play a key role in adjusting to return-to-work. Sub-themes emerged under each main theme (Table 1).

Conclusions: Both BCRL and its treatment have direct and indirect effects on work, with environmental and personal factors also shaping the work-return experience. This study suggests that breast cancer survivors with lymphedema who wish to return to work face potential barriers, and that gaps remain in the availability of supports that might facilitate workforce re-entry and maximize retention.

Breast Cancer-related Lymphedema (BCRL)	Treatment of BCRL (bandage, etc.)
<p>Physical Function: Limitations included upper extremity strength and range of motion, endurance for carrying, bending, and decreased fine motor skills (i.e. pick up a pen); BCRL infection affects the function</p> <p>Emotional function: long-term emotional stress</p> <ul style="list-style-type: none"> Less spontaneous: fear of infection Sense of lost control /loss of normality at work <ul style="list-style-type: none"> self-dissatisfied productivity less dependable viewed by co-workers 	<p>Bandages and garments are <u>uncomfortable at work</u> (Negative & <u>positive</u>)</p> <p>Bandages <u>compromise work activity</u></p> <ul style="list-style-type: none"> Affect physical function & direct interference <p>Bandages <u>draw unwanted attention & distract from job role</u></p> <p>BCRL management <u>affect work lifestyle</u></p> <ul style="list-style-type: none"> Add time burden to routine Create unwanted attention Bandages/sleeves altered self-image
Environmental Factors	Personal Factors
<p>Limited BCRL awareness and resources for patients</p> <ul style="list-style-type: none"> Lack of BCRL awareness by the public (including workplace) Unmet need for individualized support from the healthcare providers <p>Various social supports vary positively with RTW experience</p> <ul style="list-style-type: none"> Clinician, family member, friend, neighbor Workplace support: support from co-worker, flexible work schedule & sick leave, healthcare insurance 	<p>Motivated to work</p> <p>Comfort in seeking help</p> <p>Positive attitudes towards challenges</p> <p><u>Coping strategies</u> were developed along the way to work-return</p> <ul style="list-style-type: none"> Time management of BCRL therapy & work Development of adaptations to address functional change Adjust work activities (or change job)

Table 1. PUZZLE of BCRL & WORK

[P8] HEALTHY LEGS CLASS-A STEP FORWARD IN THE MANAGEMENT OF CHRONIC LEG OEDEMA

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Introduction: The lymphoedema service identified increased referrals into their service for patients with chronic leg oedema as a result of obesity, immobility and poor venous systems. The management plan for these patients needed to be evaluated to improve patient outcomes and make best use of resources. On assessment they presented with many co-morbidities, chronicity and mental health issues; many faced social isolation, rarely leaving the house. Concordance, compliance and motivation can be challenging in managing those with a long term condition.

Aim: The aim was to find an improved treatment pathway for sustained long term improvement and maintenance. Simply delivering decongestive lymphatic therapy (DLT) does not empower the patient. Although improvements were gained they were not maintained. It was clear that more education, support and encouragement to take on their self management was vital.

Method: A programme was devised over 4 successive weeks. This included education on the causes and exacerbating factors for leg swelling. Participants were taught about the four cornerstones of care and time was taken to explain how each aspect helped. At each session they were also given exercises to complete and a tailored home exercise programme. On initial assessment and at the end of the programme the participants were weighed. They were also given an activity record to encourage them to keep active. The groups were small with 4-8 participants depending on the ability of the group. They were mixed in age, gender and ability, however at times a high or low functioning group was held to tailor further to the needs.

Results: Not only did the class receive very positive feedback but the participants demonstrated increased knowledge of their condition and increased confidence in managing it. For some the results and impact have been very significant. One participant had attended his treatment room nurse 3 x week for over 1 year with 'leaky' legs; since attending the 4 weeks he has been 'dry' and in garments with no attendances. For others it's been able to wear proper shoes so they can go out.

Conclusions: In 2018 the lymphoedema service has managed 19% of referrals through this pathway. Those who complete the programme are offered DLT/garments/bandaging as appropriate. The uptake is lower compared with previous as there is a better understanding of the importance of self management and they are motivated to make the change themselves. They understand we cannot 'fix' them but empower them.

[P9] REDUCED TISSUE FIBROSIS WITH ADDITION OF TEXTURED COMPRESSION GARMENTS TO EDEMA MANAGEMENT PROGRAM

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Introduction: Chronic edema is associated with significant trophic changes including not only increased volume but also trophic changes.1-3 (Partsch & Mortimer 20151, Muldoon & Hildegard 20132, Partsch & Moffat 20123) Compression has been shown to have a positive impact on trophic changes including reduced tissue fibrosis.1-4 It has been observed that textured compression, utilizing chipped foam or channelled foam, has a significant improvement on tissue fibrosis.5

Aim: Aim of this study was to objectively measure the change in tissue fibrosis following the use of a textured compression product.

Method: Observational study tracking outcomes of 4 patients (n) utilizing a textured compression garment at night. Objective measurements included: volume of the limb, tissue density, and subjective feedback from patient. Measurements were taken at three different intervals over a two month period. Tissue density was measured using a tissue tonometer. 6-8

Results: In all subjects, both volume and tissue fibrosis were reduced. Two out of four subjects were recorded with at least a 5% reduction in volume and two out of four subjects recorded a %5 tissue density improvement. Patients reported increased movement and reduced heaviness of limb.

Conclusions: The use of textured compression garments as part of a night time regiment reduced tissue fibrosis for patients with chronic edema. Additional study is warranted to assess impact on overall compliance and concordance with a compression regiment.

[P10] THE USE OF NIGHT TIME GARMENTS FOR CHRONIC EDEMA MANAGEMENT IMPACTS PATIENTS' QUALITY OF LIFE AND EDEMA MANAGEMENT

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Introduction: Successful management of chronic edema requires a commitment to compression bandaging, garments and/or use of alternative bandage wraps (Whitaker 20171, ILF 20122) Some patients require continuous compression day and night.1,3

Aim: The aim of this investigation was to assess the impact on volume control and patients' quality of life (QOL) with the addition of a nighttime garment to their compression regiment.

Method: This observational study details four patients (n=4) medical history, subjective reports and objective measurements of limb volume and self-reported QOL before, during and after the addition of a nighttime garment to their compression regiment. Circumferential measurements were taken to track limb volume and The Lymphedema Quality of Life (LYM-QOL)⁴ questionnaire was used to capture patient's self-reported improvement in quality of life. The assessment period was over 6 weeks. Measurements were taken at three different intervals.

Results: It was observed that all subjects had an improvement in their self-reported quality of life (via LYM-QOL). Limb volume was stable in two out of four patients. Two out of four demonstrated further volume loss with the addition of nighttime product.

Conclusions: The addition of a nighttime compression device demonstrated positive change in self-reported QOL as well as better overall edema management. Patients who previously had struggled with long term edema management demonstrated improved edema control. Additional investigation is warranted to study impact of inclusion of a night time garment as part of the standard of care for those patients living with chronic edema.

[P11] TECHNOLOGIES FOR PERSONALIZED NUTRITION

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Introduction: Lymphedema and lipedema are associated with gut dysbiosis, an unhealthy change in gut microbes characterized by increases in pro-inflammatory and pathogenic gram-negative bacteria, reductions in anti-inflammatory bacteria, and decreased short-chain fatty acid production. Gut dysbiosis also drives obesity, type 2 diabetes, and other conditions via multiple mechanisms including elevated blood glucose levels.

The goal of nutritional therapy is to reduce or eliminate gut dysbiosis by improving eating patterns (food choices, quantities, and timing) and activity. These change the mixture of gut microbes, and improve associated conditions, including blood glucose levels.

Monitoring gut dysbiosis using stool samples is impractical but blood glucose levels are easily measured and make a reasonable proxy. Current and 90-day average glucose levels (indicated by hemoglobin A1C levels) can be measured by lab tests or consumer devices. Continuous glucose monitors that record levels every 5 minutes are available.

Nutrition research using big data (800 participants and 46,898 meals) shows that post-meal glucose levels vary considerably between individuals. Each person is consistent in how their glucose levels respond to each food item. When different people eat the same meal there can be large differences in both the direction and size of post-meal glucose changes. For example, a food that increases glucose levels greatly for one person may decrease glucose levels slightly for another person. [Zeevi, D. Cell 2015]

Personalized nutrition systems can provide meal plans that are more effective in managing glucose levels than generalized guidelines or meal plans based on calories, carbohydrate counting, or glycemic index.

Aim: Provide an overview of personalized nutrition research and technology options suitable or people with lymphedema/lipedema.

Method: Review the literature on personalized nutrition and extract relevant insights for people with lymphedema/lipedema.

Results: Blood glucose measurements can provide useful insights into gut dysbiosis and other aspects of metabolic health.

Personalized nutrition apps can provide useful insights but have limited applicability to lymphedema and lipedema at this time.

Technology is available for individual monitoring and experimentation.

Conclusions: Tools for personalizing nutritional recommendations are available and can be effective, subject to certain limitations. We need more research into how to utilize these tools, and how to share and expand individual insights with the entire lymphedema/lipedema community.

Glucose levels are a useful proxy for gut dysbiosis. However, glucose is only a single nutrient and meal planning must include all nutrients, vitamins, and minerals required for overall health.

[P12] DOUBLE FOCAL COMPRESSION BANDAGING. EIGHTEEN YEARS OF FOLLOW UP. AN EFFECTIVE AND EFFICIENT THERAPY FOR HEALING VASCULAR ULCERS IN LOWER LIMBS.

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Introduction: Vascular leg ulcers have a high socioeconomic cost in world health systems. This is a clinical experience in the healing of vascular ulcers in lower limbs (18 years follow up) in more 100 patients. We have to improve tissue perfusion in the wound bed, applying external pressure using a compression technique: "Double focal compression bandaging".

Aim: To use the effect of local pressure on the wound bed for healing vascular ulcers.

Method: The first bandage is used for the focal compression of the wound bed and another bandage covers the first, to achieve a gradual external compression from the toes to the knee., each turn of the band covers the preceding tour by 50-70%. The area of the ulcer receives the pressure of 3 layers (that of the pressure over the wound bed, and the double effect of the external gradual compression). It is necessary: A/ To make a differential diagnosis. B/ To establish a clinical diagnosis. C/ Measurement of the Ankle Brachial Index to exclude severe arterial disease.

Diagnostic tools: A/ Hand held Doppler ultrasound device. B/ 5.07 Monofilament and 128 Hz tuning fork. C/ Scales. D/ The Edinburgh claudication questionnaire. E/ Camera.

Results: A representative showing of clinical cases, healed by means of this technique. 1.- Early treatment is essential for healing venous leg ulcers. 2.- It is only necessary mechanical debridement. Simply the focal compression will be enough to provoke its autolytic debridement. 3.- We have observed contamination of wound bed, but not infection. Only antibiotics oral are used, if there are signs of infection, such as fever and cellulitis. Local pressure on the wound bed avoids using any kind of antimicrobial agents. 4.- Compression is strongly contraindicated in the event of severe peripheral arterial disease, but in expert hands and according to signs and symptoms, making a daily follow up, it is possible and convenient applying compression therapy. 5.- We have to be patients, the ulcer may take months, even years, to fully heal. 6.- New ulcers may appear even in other part of the same leg being treated. 7.- No recurrences have been observed on the treated area. 8.- Several patients with cardiac failure (excluded grade IV) were treated by compression therapy.

Conclusions: 1º It is effective and efficient technique, because we achieve to heal the ulcers with optimal resources. 2º Cooperation of people who live with the patient is necessary.

[P13] RELATIONSHIP BETWEEN CONTENTS OF BREAST CANCER TREATMENTS AND LYMPHATIC VENOUS ANASTOMOSIS IN THE PATIENTS WITH BREAST CANCER RELATED LYMPHEDEMA

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Introduction: Lymphatic venous anastomosis (LVA) has been widely adopted for one of surgical treatments in breast cancer related lymphedema (BCRL). However, it is still unknown on relationship between contents of breast cancer treatments and LVA. In this paper we report how irradiation and chemotherapy for breast cancer effected on results after LVA in BCRL patients.

Aim: The aim of this study is to reveal risk factors in postoperative compression after lymphatic venous anastomosis.

Method: Forty-five patients with BCRL between in 2011 and 2017 in our hospital were included in this study. They were classified into stage II late in ISL classification and had LVA with the average of 4.5 anastomoses. Near infrared florescence lymphography was performed about 6 months after LVA to evaluate lymph-flow changes. We investigated volume changes of the affected limbs at the same timing. If there was no sign of deterioration, we recommended discontinuity to put compression garments. Out of 45 patients 25 underwent postoperative radiation and 22 underwent chemotherapy with taxane (TX). Volume of the affected limb were evaluated before and 1 year after LVA.

Results: Out of 45 patients 32 (71%) discontinued to put garments with the average reduction of 25 ml in volume, and 13 (29%) continued with the average reduction of 35 ml in volume. In the 25 patients with radiation 14 (56%) discontinued to use compressive garments and 11 (44%) continued. In the 35 patients with chemotherapy 12 (34%) discontinued to use compressive garments and 23 (66%) continued. In the 22 patients with TX 12 (55%) discontinued and 10 (45%) continued.

Conclusions: It is important for the patients to become free from compression, which can increase QOL of the patients. In this study more than 70% of the patients with LVA could discontinue to put compression garments. However, in the patients with postoperative radiation and/or TX about 55% of them discontinued after LVA. Postoperative radiation and TX seemed to be risk factors to reduce contents of compression therapy after LVA, so we think it is important to support them to keep compression therapy for long time.

[P14] Lymph – edema -flow: What are you for me? Friend or enemy?Marielena Papageorgiou¹¹ Papageorgiou Hospital Thessaloniki Greece, Primary Lymphedema, Athens, Greece

Introduction: You follow me since I was born. First, discreetly as a friend, enjoying everything through school time. In the process, you suddenly changed. I was making excuses because we were both teenagers. We were together studying, loving; making holidays. I didn't complain that you bloated. But you did. I couldn't imagine that you would become an enemy for me. They called me beautiful. They called you fatty. You were jealous. You always told me: "Don't wear a mini skirt neither high heels". Finally, I created my own style, and I kept on living like a normal teenager.

Aim: At the same time, I was doing gymnastics, dancing, having lymphatic massage, wearing compression garments. You were never satisfied. I fought to overthrow you. I couldn't stop you. And that's how I started hating you because you complicated my daily routine. Since you didn't listen, I would stop you. And I "googled" you: lymphedema. I would cut off "the flow" finding the right people. I was so determined: tomorrow we're travelling mom.

Method: My first battle! I won, you lost. In Germany I left much of your flow. And I photographed new countries. I was traveling with your flow. My joy didn't last much. You were back. Powerful and stubborn. "No, Mom! I'll go again." Too many expenses! You were back with more flow; like you wanted to stop the flow of my dreams. Two flows at a simultaneous battle that seemed to last forever. My flow was trapped in yours. You were no longer jealous. Just mean. Now I had an enemy to face. And I was about to give up. But I also had my mom. "Life is a struggle". I should win! "Well Marielena, back to the start."

Results: This time I was lucky enough to find a clinic and a doctor in Greece. A new friend to beat the enemy. After LNT, LVA and SAPL, within 2 years I've won the flow.

Conclusions: I'm happy now. I wear whatever I want and I work. Furthermore, I share the joy of winning with my people. We were together during this journey, you made me feel unique and I became stronger; capable of defeating you, of understanding you. 35 years together. I've learned that lymphedema lives inside and is nurtured by you. It lives because of you. Accept and love it. Enjoy the little ones, dance to the big ones.

[P15] EFFICACY AND SAFETY OF COMPRESSION BANDAGES FOR CHAIR-BOUND ELDER PERSONS WITH CHRONIC LEG EDEMA IN A JAPANESE SPECIAL NURSING HOME: A PILOT STUDYTerumi Ueda¹, Yuko Matsui¹, Junko Sugama²¹ Komatsu University, Nursing, Komatsu, Japan² Health Sciences, Kanazawa University, Advanced Health Care Science Research Unit, Innovative Integrated Bio-Research Core, Institute for Frontier Science Initiative, Kanazawa University, Kanazawa, Japan

Introduction: Although many chair-bound older persons develop chronic leg edema as a result of prolonged sitting, few treatments for leg edema are provided in Japanese special nursing homes because the residents accept edema as a consequence of aging and medical staff are hesitant to treat edema associated with age-related impairment of cardiac function. It is unknown whether compression bandages are safe and effective in older persons with leg edema caused by prolonged sitting.

Aim: Our aim was to assess the efficacy and safety of compression bandages for chair-bound older persons with leg edema in a dedicated Japanese nursing home.

Method: The participants were two residents of a dedicated nursing home with leg edema caused by prolonged sitting. We applied compression bandages using tubular and short elasticized bandages for three weeks. We measured compression pressure and gradually increased it to minimize the load on the heart. We assessed circumferences of the feet and ankles, and leg volumes estimated by circumference, measurements being taken every 4 cm. The circumferences and leg volumes were normalized to pre-intervention values and compared to post-intervention values at 1, 2, and 3 weeks. In accordance with standard safety procedures, echocardiography was performed before the intervention. To assess cardiac function, we checked cardiac sounds, respiration, oxygen saturation, blood pressure, and pulse rate before and after the intervention.

Results: Case 1 was a woman in her 70s with normal cardiac function as evidenced by percent fractional shortening (%FS) of 42.3% and inferior vena cava (IVC) diameter 11 mm. In 3 weeks, the circumferences of the right and left foot decreased by 93.7% and 95.0% respectively, of the right and left ankle by 90.5% and 90.5%, respectively, and the right and leg volumes by 88.4% and 96.4%, respectively. No adverse events occurred.

Case 2 was a woman in her 90s with normal cardiac function as evidenced by %FS 28% and IVC diameter 15 mm. In 3 weeks, the circumferences of the right and left foot decreased by 93.1% and 92.7%, respectively, of the right and left ankles by 86.7% and 92.7%, respectively, and the right and left leg volumes by 90.8% and 96.6%, respectively. No adverse events occurred.

Conclusions: Compression bandages safely decreased chronic leg edema in two chair-bound older women with normal cardiac function when the compression was increased gradually while monitoring cardiac function.

[P16] UNCOMPROMISED COMPRESSION

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Introduction: Compression is an absolutely essential treatment of lymphoedema but in order to be effective, it has to be used. Compliance over many years is therefore absolutely imperative as compression is vital for therapy. Competence and consistency are required from the treatment team, as well as a convinced patient.

Aim: The internet provides an almost instant access to subjective reviews of physician strengths as well as, on too many occasions, weaknesses. Also health-insurers may no longer pay unless an evidence-base for consistency, both with regard to the methods of diagnosis and the effect of treatment, can be provided.

Method: After many years experience in a German Lymphoedema Clinic, Dr Jungkunz was able to use the evidence-base of his various random controlled studies to endorse procedures in his dermatological and lymphological practice in Friedberg, Germany. These will be described.

Results: The evidence for the effectiveness of the diagnostic use of the ultrasound at 18MHz and tailor-made prepared bevelled urethane foam inserts sewn into hosiery have been confirmed (Refs. 1, 2).

Conclusions: As yet there is no proven intervention for the reliable long-term control of lymphoedema apart from prescribed compression with garments that have been manufactured under strict quality-controlled conditions. The patient must be motivated and taught by experienced and sympathetic surgical fitters. There should be no compromises for this treatment method.

Ref.:

1. Reducing lymphostatic fibrosclerosis in different skin layers during complex physical decongestive therapy. Results of a randomized controlled trial with 88 patients. Noori S, Petereit R, Rindermann J, Jungkunz H. W. Lymphologie in Forschung und Praxis 2/2014 Translation Massey 2016
2. Compliance improved by competence: compression hosiery concordance needs leadership and teamwork. Massey J, Jungkunz H W, Strubel G, Tzscheuschler R. RCGP Conference, Liverpool October 2017

[P17] APPROPRIATION OF EVIDENCE FOR GUIDELINES

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Introduction: The process of Guideline production has been described by Sietse Wieringa (Ref. 1), emphasizing that: „It is important for guideline developers to feel they are part of a community of practice that encourages epistemic (the scientific study of knowledge) skill development, rather than a hierarchical community where superior guideline methods are defined by a small group of experts.”

Aim: German Guidelines on the diagnosis and therapy of primary lymphoedema were published in 2017 (Ref. 2), and have subsequently been translated into English. A further German guideline (Ref. 3) concerns the diagnosis and therapy of Dermatosen in relationship to lymphostasis. It is important that these are integrated into European and International Guidelines.

Method: In view of the many years developing his own dermatological and lymphological practice by diagnosing, treating and following many thousands of lymphoedema and lipoedema patients, as well as Dermatosen in relationship to lymphostasis, Dr Jungkunz has contributed to both sets of German guidelines by providing evidence from randomized controlled trials. The importance of the development of the German Network for the treatment of Lymphoedema in central Germany will also be described.

Results: Duplex Ultrasound at 18MHz has proved to be an effective and harm-free tool for the diagnosis and follow up of compression therapy in primary and secondary lymphoedema, lipoedema as well as venous incompetence and wound healing.

Conclusions: Lymphoedema is still a relatively unknown condition in Germany. Without Consensus Guidelines there are difficulties in obtaining funding for treatment from Health Insurers. Evidence-based studies along with increasing understanding of patients are still needed.

Ref.:

1. Different knowledge, different styles of reasoning: a challenge for guideline development Sietse Wieringa et al BMJ Evidence-based Medicine G-I-N <http://dx.doi.org/10.1136/bmjebm-2017-110844>
2. Diagnostik und Therapie der Lymphödeme - AWMF: (Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften e.V.) <https://www.awmf.org/leitlinien/detail/II/058-001.html>
3. S1-Leitlinie 0123-084 Dermatosen bei dermalen Lymphostase AWMF 07/2017

[P18] COMPRESSION THERAPY - PRACTICAL PROBLEMS AND INNOVATIVE SOLUTIONSArun Gogia¹, Shashi Gogia²¹ All India Institute of Medical Sciences, Sanwari Bai Surgical Centre, New Delhi, India² Society for Administration of Telemedicine and Healthcare Informatics, Surgery, New Delhi, India

Introduction: Despite many advances, - in diagnostics, types of bandages, compression garments MLD, pumps etc., lymphedema care is still in its infancy with most patients either being neglected. Many do not have adequate insurance cover to participate in a well-defined long-term care program.

We bring forth an over thirty years' experience of compression therapy in managing various kinds of lymphatic and venous problems, including due to filariasis, cancer related, as well as other types of lymphedema and venous ulcers. We have consistent results which the processes have been evolved over time and required correcting various issues through team work and mutual discussions.

Aim: Case reports and outcomes from two regular clinics -one private, one at a public hospital along with some experience at various camps for lymphoedema care held at a variety of locations including a village in an endemic area.

Method: Patients were evaluated clinically by subjective improvements including Some innovations from our side included – use of group therapy, motivational support from treated patients, Individualized compression regime according to comfort, intelligence as well as affordability. During this period 3 formal clinical trials were also held. Penicillin, either oral or injectable helped in reducing Incidence of Adeno Dermato- Lymphangitis attacks.

Results: There have been over 2500 patients seen at the above locations. Overall outcomes are reduction in ADL attacks, increased self-confidence and return to work, with volume reduction between 50-70%, Ulcer healing rate was over 90%. Recurrences were related to discontinuation of self-care mostly due to torn or worn out bandages and stockings and sometimes due to stoppage of long-term penicillin. After treatment, even near suicidal patient showed remarkable self-confidence, could marry and help in counselling other patients.

Conclusions: Lymphedema is treatable. Training in selfcare is an important component. The processes have to be individualized with a great role of counselling not only by the clinician but also through creation of self-help groups between patients.

[P19] ADOPTING A NEW E-COMMUNICATION APPROACHJane Rankin¹¹ The Lymphoedema Network Northern Ireland (Lnni), Physiotherapy Dept, Level 1, Cancer Centre, Belfast Hsc Trust, Belfast, United Kingdom

Introduction: The Lymphoedema Network Northern Ireland (LNNI) was formed in 2008 with a role to change the emerging picture of lymphoedema care over the next 10 years, whilst ensuring the best use of scarce specialist expertise and standardising quality services.

Education and communication strategies were developed which inherently linked general health promotion, screening, and facilitation of early diagnosis and self-care/awareness for patients. This included:

- Improved referral practice: diagnosis and access into service
- Undergraduate engagement
- The empowerment of "At risk" patient groups – prevention and aid for early self-referral
- Accessible, specialist, high quality care
- improved self-management (long term conditions model)

Many tools were developed and performance audited to ensure success: posters, booklets, website and briefing cards. In recognition of cultural communication changes, a new e-health project was developed.

- Aim:**
1. Development of an App to replace the current limb volume calculator to increase regional accessibility and measure consistency, and reduce cost. It is not a medical device (as it is not used to diagnose a condition i.e. purely measures a symptom). Body Mass Index (BMI) calculation is included in function
 2. To transfer LNNI patient information onto a e-platform to increase access and choice of platform

Method:

1. A project team involving LNNI, the Ulster University and the Public Health Agency was formed; LNNI worked with a mathematician to develop a spread sheet to calculate limb volume. This was piloted across all 5 trusts to compare the outcome with that of legacy calculators/software, and found to produce similar results (with millilitre differences due to the number of decimal places used in the formula). A mathematical model was developed and tested for BMI. A University post-graduate student worked with the team to develop the actual App, ensuring that the clinical team was involved in screen design and design outcome.
2. A service user, who is a professional IT consultant, worked in a philanthropic role with LNNI to transfer some of its published patient information leaflets into an e-medium suitable for phones and tablets. This was piloted with both healthcare staff and by other service users. Service users had been involved in the design of the original paperwork.

Results/conclusion: This project has ensured that LNNI has continued to progress its activities to meet the changing cultural demands of both healthcare workers and also service users.

[P20] LYMPHOEDEMA NETWORK NORTHERN IRELAND: 10 YEAR REVIEW AND 5 YEAR FORWARD PLAN

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Introduction:

The Lymphoedema Network Northern Ireland (LNNI) was formed in 2008 to change the emerging picture of lymphoedema care whilst ensuring the best use of scarce specialist expertise and standardizing quality services.

A 10 year review was produced alongside the 2018 demographic report and referenced the baseline data. The original strategies to enhance services: education and communication were underpinned by the 2008 CREST recommendations. The key objectives included:

- Develop lymphoedema services as a managed clinical network - coordination, leadership and governance
- Awareness education for other healthcare professionals
- Develop lymphoedema e-data base

The initial outcome delivered:

- Services modernised into a coordinated, influential and effective network
- 2 year waiting times reduced to meet regional AHP access targets: 13 weeks for routine, 1 for urgent
- Access inequity addressed with centralized referral points to improve pathway, resulting in annual increased referral rates
- Inequity of cancer-related lymphoedema versus non-cancer lymphoedema access resolved
 - 2008: 95% services cancer-related lymphoedema (CRL)
 - 2018: 40% CRL and 52.2% non-CRL (remainder 5.8% primary lymphoedema and 2.1% lipoedema)
- Specialist staffing pool levels increased
- Lack of generalist/referrer knowledge addressed
- Audit of practice:
 - 95% service users offered optimal, tailored treatment
 - 5% treatments modified due to lack of resources
- 2011 development of e-minimum data set
- 2011 audit of CREST recommendations: 43 out 46 achieved (3 linked to external agencies)
- Patient voice integral at all levels (Board/trust) via direct engagement in work plan including service user satisfaction

Aim: To inform a new regional work plan for 2019-2024

Method: The LNNI Board convened a facilitated workshop to review achievements and focus the 2019-2024 work plans taking into account new challenges.

Results: The 2019-2024 focus will be:

1. A health needs assessment to reflect the changing referral/caseload challenges
2. Clarification of how, and who, manages simple chronic oedema
3. Management of red legs
4. Evolving risk reduction education
5. New pathways for differing caseloads
6. Lipoedema
7. Review of palliative care roles
8. Evolving children's services
9. Domiciliary expectations
10. Liposuction
11. Evolving minimum data set

The Board agreed 5 roles for the lead to continue to influence on:

1. Obesity
2. Mental health and dietetic access
3. All-Ireland working
4. National and international partnerships
5. Non-medical prescribing roles

Conclusion: This facilitated process allowed the LNNI Board, including service users, to debate the challenges and agree the work plan for 2019-2024.

[P21] HOW MANY LYMPHEDEMA PATIENTS HAVE PROBLEMS WITH FOOT AND TOE?Angelique wiene van Ooijen¹¹ Bispebjerg Hospital Region Hs, Department of Dermatology and Copenhagen Wound Healing Centre, Copenhagen, Denmark

Introduction: One of the signs of lymphedema in lower limb, is swelling of leg and foot. In our clinic we do different assessment to diagnose lymphedema in lower limb, etc. if there are positive or negative Stemmers sign. When we make this examination, we often note other foot and toe problems.

There can be different kind of complication such as swelling toes, fungal infection, corns, hyperkeratosis, ingrown toenails, very dry skin and pain in toes. These problems can cause infection.

Aim: How many patients with lower limb lymphoedema have problems with their foot and toes?

Method: I will make a pilot study in two months from d.2/1-2019 to 2/3-2019, on all patients in our lymphoedema clinic.

I data collection form are interviews and assessment.

Results: I will present the results of this pilot study on a poster presentation.

With this pilot test, I hope to increase awareness of how many of our patients, with lymphedema, that have problems with their toe and foot.

[P22] GRADED NEGATIVE PRESSURE: DOES IT HAVE A PLACE IN THE CDT TREATMENT MODEL?Paula Donahue¹¹ Vanderbilt University Medical Center, Physical Medicine and Rehabilitation, Nashville, United States

Introduction: Complete decongestive therapy (CDT) is a conservative therapy commonly employed to manage lymphedema. CDT includes compression, skin hygiene, exercises and manual lymphatic drainage (MLD), a manual technique to mobilize lymphatic congestion^{1, 2}. A recent study illustrated that the lymphatics are capable of withstanding higher surface pressures than previously believed³, which supports refined applications of MLD: When lymphatic congestion advances to higher stages with thickened fibrotic tissue, this hardened tissue will not mobilize well using traditional MLD of light pressure, and rather respond to greater pressures to assist the movement of the interstitial fluid through these hardened soft tissues to lymphatic collaterals^{3, 4}. Now, a device is available using graded negative pressure application which may augment the impact MLD techniques have on congested superficial tissues. Graded negative pressure application allows for an additional outward pull of the tissue with option for combined lateral and rotational tissue stretches that when used in conjunction with MLD may enhance clearance of interstitial lymphatic congestion by facilitating a more comprehensive 3D mobilization of tissue⁵. However structured trials showing objective efficacy of CDT with and without graded negative pressure have not been performed.

Aim: To obtain preliminary data investigating if mobilization of protein-enriched hardened tissue using graded negative pressure therapy in conjunction with CDT will improve patient-valued functional outcomes compared to standard CDT.

Method: Six patients with advanced secondary arm or leg lymphedema received sequential CDT with and without graded negative pressure therapy. The therapy was provided by the same trained lymphedema physical therapist to minimize differences in manual techniques when a patient underwent CDT alone and later CDT with graded negative pressure. Patient Specific Functional Scale (PSFS) was evaluated at the beginning and end of both treatment courses.

Results: Patients improved with both conservative therapies however PSFS scores increased 3.2 ± 1.4 points in CDT with graded negative pressure vs. 2.5 ± 1.7 when the same patient received CDT alone. This greater improvement in quality outcomes measurement supports the individual patient reports of tissue feeling softer, lymphedema easier to manage, and limb feeling lighter with less pain following CDT with graded negative pressure vs CDT alone.

Conclusions: In this pilot study, the inclusion of graded negative therapy with CDT provided further improvements in patient valued outcomes than CDT alone. Further investigation is warranted to evaluate quantitative and qualitative treatment impact on these two conservative therapies.

[P23] USE OF KINESIOTAPE IN THE MANAGEMENT OF NECK LYMPHEDEMA AFTER OROPHARYNGEAL CARCINOMA

Virtu Arora¹

¹ Stanford Valleycare, Psm, Stockton, United States

Introduction: Oropharyngeal cancer is a type of head and neck cancer. Sometimes more than one cancer can occur in the oropharynx and in other parts of the oral cavity, nose, throat, larynx (vocal cords), trachea, or esophagus at the same time. Most oropharyngeal cancers are squamous cell carcinomas. Squamous cells are the thin, flat cells that line the inside of the oropharynx. Current treatment options include surgery, gland removal, lymph node removal, chemotherapy and radiation therapy which can cause head and neck lymphedema.

Aim: To demonstrate role of physical therapy, kinesiotape and successful rehabilitation of patients with lymphedema after oro-pharyngeal carcinoma.

Method: Three patients with oropharyngeal carcinoma were chosen for this study. Patient 1 is a 55y/o male with oropharyngeal cancer, 23 lymph node removal, parotid gland removal, tongue biopsy, throat scope with 39 radiation treatments and 7 rounds of chemotherapy. Patient 1 has received speech therapy for trouble swallowing after surgery. Patient 2 is a 75y/o male who developed cancer at the base of tongue and received radiation therapy. Patient 3 is a 62y/o male who developed throat cancer followed by radiation and chemotherapy. All patients were referred to the lymphedema clinic with chief complain of throat feeling like a "frog's throat" especially in mornings. The lymphedema did not subside during the day. All patients received instruction in manual lymph drainage (MLD), skin care, decongestive exercises and a night compression chin strap. Kinesiotape was used in management of lymphedema due to its hypo allergenic quality and ease of use on body parts like neck. The treating therapist is a certified kinesiotaping practitioner and instructor. Patients were seen once a week for 3 weeks.

Results: All 3 patients were able to self-manage the neck lymphedema with alleviation of the "frog's throat" symptoms in 2-3 weeks.

Conclusions: Kinesiotape serves as an essential modality in management of lymphedema after oropharyngeal carcinoma. A thorough knowledge of anatomy of superficial lymphatic system anatomy is needed for successful taping application.

[P24] DECLINING AND LOW REIMBURSEMENT RATES MAY BECOME A LIMITING FACTOR TO PHYSICAL THERAPISTS PROVIDING COMMUNITY-BASED LYMPHEDEMA CARE IN THE PRIVATE PRACTICE SETTING

Maureen McBeth¹

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Introduction: There is a paucity of evidence-based research on the direct and indirect costs of providing lymphedema care in the United States (Stout NL, et al). Along with an even smaller number of studies looking at the reimbursement structures of both public and private payers, private practice clinics have little data to make key business decisions to support the economic health of their clinic. Furthermore, recent reductions in reimbursement from private payers (10% from a major provider) and low per-visit payment structures have resulted in an average loss of revenue for patients being treated for lymphedema. The data is from a single private practice physical therapy office providing in-network services for patients referred for lymphedema management and prospective surveillance.

Aim: The purpose of this research study is to describe the economic impact on a private practice outpatient clinic that is trying to provide evidenced-based care for lymphedema (including prospective surveillance) in a suburban community-based setting. We will also aim to propose alternate reimbursement strategies that will support the economic viability for treatment of lymphedema in this practice setting.

Method: An internal audit will be performed using deidentified data that will be collected from electronic health record reports from our single clinic in 2018. Search criteria will include records limited to the two physical therapist who are certified lymphedema therapist and further sorted for all records with ICD-10 coding for I89.0, I97.2 and Q82.0. Ongoing data will be collected in the first quarter of 2019 when the clinic switches to providing out-of-network services.

Results: Preliminary data shows that declining and low reimbursement has created a financial barrier to providing lymphedema services. Data will be provided to examine the economic impact and potential implications for continuing the lymphedema services in the private practice community-based setting. Data will also be presented comparing being an in-network provider to the first three months of transitioning to providing out-of-network services.

Conclusions: Preliminary data demonstrated a significant loss of revenue that was not supporting the on-going provision of services as an in-network provider. The clinic transitioned to provide out-of-network services as of January 1, 2019.

Ref.:

A systematic review of care delivery models and economic analyses in lymphedema: health policy impact (2004-2011).

Stout NL, Weiss R, Feldman JL, Stewart BR, Armer JM, Cormier JN, Shih YC.

Lymphology. 2013 Mar;46(1):27-41. Review.

PMID: 23930439

[P25] ROLE OF COMPLETE DECONGESTIVE THERAPY (CDT) IN CHRONIC VENOUS LEG ULCER (VLU) HEALING.

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Introduction: VLU's are a common chronic recurring condition and a major cause of morbidity and disability affecting approximately 1% of the US adult population, or about 3 million Americans. 95% of VLU's are in the lower leg gaiter area, around the malleoli. Management of VLUs include graded compression, 20-40mmHg, that increases the limb hydrostatic pressure and reduces the superficial venous pressure. Treating venous leg ulcers can be time-consuming and costly affecting patients' quality of life. In a recent study, a total of 50 patients healed their VLUs without recurrence in a mean time of 122 days (range, 6-379 days) at a cost of \$10,563 (range, \$430-\$50,967). Inpatient admission for wound-related issues like cellulitis with intravenous antibiotics, increased total cost. A Cochrane review found that adherence to multidisciplinary guidelines was associated with 6.5-fold increases in the VLU healing among US and British patients. This case study demonstrates that the specialized care provided by complete decongestive therapy (CDT) can help reduce time and cost of healing for VLU.

Aim: To establish role of Physical Therapy and Complete Decongestive Therapy in lymphoedema management and chronic venous leg ulcer healing.

Method: Two patients with the diagnosis of chronic, non-healing, large venous ulcers were chosen for this study. Patient 1 is 62y/o obese white male who stopped taking his diuretics and the legs started with odorous drainage. Patient 2 is a 56y/o morbidly obese white male with chronic bilateral leg edema with a history of cellulitis and hospitalization. Pt is now diagnosed with chronic non healing venous ulcer on right calf. Both the patients received CDT 3 times a week for 3 weeks and were fitted into compression garments at discharge.

Results: Complete healing of wounds was achieved in both patients in a short period of time (21days).

Conclusions: Early outpatient treatment of VLU utilizing CDT will reduce total time and cost of healing by preventing complications while improving outcomes. Further research is needed.

[P26] NATIONAL LYMPHOEDEMA FRAMEWORK IRELAND - CHILDRENS LYMPHOEDEMA CAMP

Norah Kyne¹

¹ ., ., ., Ireland

Introduction: In 2018, the NLFI developed and hosted a lymphoedema camp specifically for children and their families and carers. Adjusting to life with lymphedema can be a challenge for the child, their parents and their siblings. It is important that the family has knowledge/understanding and the child with lymphoedema is an active participant in their own well-being. The workshop aimed to engage and inform all participants.

Aim:

- Education for the child and immediate carers
- Treatment and instruction for ongoing management of the condition.
- Exercise and activities to complement fundamental treatment schedules

Introduction to a supportive and social network for families involved with this condition

- Access to garment suppliers.
- Fun and laughter for all participating in this innovative opportunity.

Method: The NLFI developed the criteria for children attending the camp, application form, terms and conditions, programme for the day, feedback forms, certificates of attendance, venue and dates. Each member completed the Childrens First Training prior to the camp.

Posters and information about the camp was circulated to the national paediatric services, lymphoedema patient advocate group and the registering body for MLD therapists is Ireland.

Lymphoedema industry in Ireland was approached to attend and assist in sponsoring the camp.

Results: The following feedback from children and parents capturing the essence and success of the day : " ..it was fantastic to speak with all the therapists, guest speakers and to liaise with the companies...I would love to see this as an annual event"

"....Joseph said he had a fantastic time, great to meet others with lymphoedema .. we would only be delighted if we could help out in any other way to help raise awareness"

"Thank you so much I have to complement you on the awareness day. I found it so informative and learned so much. Conor had a great day and everyone made him feel so special. Cant put in to words how grateful myself and Husband are. We took away so much from that day. And best of All Conor was on a cloud. It would be something I would defiantly recommend. "

"As a parent it was fantastic to speak with all the therapists, the Guest speakers and to liaise with the companies. I would definitely love to see this become an annual event....".

Conclusions: This is a successful model to inform children, families and carers about lymphoedema. NLFI plan to host a similar programme in 2019.

[P27] CHRONIC LOWER LIMB OEDEMA IN A POPULATION OF SAUDI ARABIA RESIDENCE WITH MULTIPLE SCLEROSIS: AN EVALUATION OF PROGRESSIVE RESISTANCE EXERCISES.

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Introduction: The prevalence rate of Chronic Lower Limb Oedema (CLLO) in people with MS (pwMS) has been reported to fall between 45% and 62%. Chronic oedema is treated by a range of interventions that can be grouped together under the term 'complex decongestive therapy' (CDT) and exercise is one element of this. However, the effectiveness of exercises in the CDT have not been investigated separately and it was always accompanied with compression bandages or garment. Therefore, it is not certain if exercises are effective if it is used in isolation.

Aim: The aim of this study is to assess the effectiveness of progressive resistance exercise (PRE) in the management of changing CLLO in people with MS who are resident in Saudi Arabia and to determine the impact of CLLO on quality of life.

Method: Two-hundred and fifty-five pwMS with an EDSS between 3 to 6.5 were screened for the presence of CLLO using a pitting oedema test. Participants were recruited through out-patient neurology and rehabilitation services at two hospitals in Saudi Arabia. Twenty-two patients were found to have CLLO and fifteen people agreed to participate in the study. Participants followed a 12-week lower limb PRE programme in which exercises were carried out biweekly. Lower limb circumference was measured prior to and following the intervention period using a 4 cm interval circumference which divided the limbs into segments. At the same time points, Quality of Life (QOL) and degree of pain experienced were measured using the Quality of Life Measure for Limb Lymphoedema (LYMQOL) tool and Short form of the McGill Pain Questionnaire (SF-MPQ).

Results: Fourteen participants completed the intervention with a mean age of 44±7.11 years, EDSS 5.6±0.96, BMI 29.08±7.91 and disease onset 12.92±3.7 years. The results show no statistically significant change occurred in limb volume overall. However, a reduction occurred in the volume of some leg segments.

In terms of secondary outcomes, a statistically significance reduction was found in the Visual Analogue Scale (VAS) domain (P=0.01) and present pain intensity (PPI) domain (P=0.02) in the SF-MPQ, and a significant increase occurred overall in QOL (P=0.006).

Conclusions: The twelve-week programme suggests that PRE may have an impact on CLLO in some lower limb segments and quality of life. Further studies are required to determine the limitations, optimal dose and duration of PRE.

[P28] FINGER SWELLING RESULTING FROM DISTAL LYMPHATIC ABNORMALITY FOLLOWING AXILLARY SURGERY

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Introduction: Breast cancer-related lymphedema (BCRL) is conventionally described as involving the entire upper extremity as a result of damage to the axillary lymph nodes and vessels secondary to surgery and/or radiotherapy. It is not uncommon, however, for patients to present with variations in the distribution of swelling, such as complete sparing of the hand. Research has indicated that such variations are associated with regional differences in lymphatic function.¹ One such unusual variation recently identified at our center was a series of three cases in which the main complaint was swelling in the second digit with minimal or absent swelling in the dorsal hand and arm.

Aim: The aim of the present report is to discuss an abnormal presentation of BCRL and review successful conservative treatment strategies including using indocyanine green (ICG) lymphography to identify the specific lymphatic abnormality and direct conservative treatment.

Method: All three patients underwent complete decongestive therapy with a certified lymphedema therapist including manual lymphatic drainage (MLD), training in self-MLD, kinesiotaping, and education regarding exercise, skin care, and risk reduction precautions. Treatment also included procurement of compression garments including trials of several brands and styles of ready-to-wear and custom compression armsleeves and gloves.

Results: Despite the relatively mild nature of their conditions, the finger swelling in each case remained persistent and bothersome until patients began wearing custom, seamless, full-fingered compression gloves (JOBST Elvarex Soft). One patient underwent ICG lymphography, which showed functional lymphatic channels draining to the axilla, however extravasation of ICG from a lymphatic channel at the distal radial forearm. Based on this finding, the patient's self-MLD sequence and compression strategy were modified.

Conclusions: Finger swelling consistent with lymphedema can develop following axillary surgery and may be associated with a lymphatic abnormality distal to the area of surgical insult. Further investigation of this phenomenon is warranted. Experience in conservative treatment of these patients indicates finger swelling responds best to use of a custom, seamless, full-fingered compression glove and daily self-MLD.

1. Stanton AW, Svensson WE, Mellor RH, Peters AM, Levick JR, Mortimer PS. Differences in lymph drainage between swollen and non-swollen regions in arms with breast-cancer-related lymphoedema. *Clin Sci (Lond)*. 2001;101(2):131-40.

[P29] LIPEDEMA -THE CHALLENGES AND THE FRUSTRATIONS -TREATMENT OPTIONSLinda-Anne Kahn¹¹ *Lymphatic Therapy Services, Lymphedema, San Diego, United States*

Introduction: Lipedema is a chronic debilitating disease affecting the subcutaneous adipose tissue of the extremities, occurring mostly in females during or after puberty or menopause. Lipedema is a poorly understood condition and health professionals most often dismiss the patient and tell them to lose weight. They are “blamed” for being overweight, told they eat too much or are “cheating” on their prescribed diets. There is a lack of sympathy and understanding. This can cause anxiety, frustration and a feeling of helplessness. This condition is a genetic abnormality and the obesity is not the patient’s fault.

The clinical presentation and symptoms of lipedema can commonly result in a misdiagnosis of lymphedema, obesity, Dercum’s disease, or chronic venous insufficiency, resulting in incorrect treatment.

Aim: In this informational workshop led by an experienced lymphedema therapist, we will explore the clinical presentation of Lipedema and differential diagnosis of lipedema, obesity, lymphedema and Dercum’s disease as well as stages and types of lipedema, complications and side effects of lipedema

Method: Participants will learn about conservative therapy for the treatment of lipedema and goals of therapy, including Dr Vodders Manual Lymph Drainage, self massage, dietary options, breathing and exercises. Lipedema affects a patient’s emotional state and quality of life. We will discuss psycho-social challenges to the lipedema patient and tools to address these challenges; compression and challenges with compression for the patient as well as surgical options

Results: Participants will:

1. Achieve a deep understanding about lipedema including symptoms, classification and stages of lipedema;
2. Gain knowledge of differential diagnosis of Lipedema, lymphedema, obesity and Dercum’s disease.
3. Understand the complications and side effects of lipedema;
4. Identify how to diagnose lipedema;
5. Learn about the treatment of lipedema both physically and emotionally;
6. Develop and understanding of the psycho-social challenges to the lipedema patient and tools to address these challenges;
7. Learn about supplements that have been shown to reduce weight and volume and help to reduce inflammation
8. Learn how foods play an important role in the treatment of lipedema.

Conclusions: The prognosis of lipedema is not fully understood and patients are often misdiagnosed.

The treatment for the Lipedema patient is complex as it is essential to treat the patient physically, emotionally and also provide nutritional guidance to avoid additional weight gain.

[P30] INCIDENCE OF LIPEDEMA IN THE STATE OF QATAR: A DATA COLLECTION BETWEEN (2016-2018).Emad Abdalla¹, Mohammed Shafi², Sumaiya Sobani³¹ *National Center for Cancer Care and Research - Hamad Medical Corporation, Doha, Qatar*² *National Center for Cancer Care and Research - Hamad Medical Corporation, Physiotherapy & Lymphedema Department, Doha, Qatar*³ *National Center For Cancer Care & Research-Hamad Medical Corporation, Physiotherapy & Lymphedema Department, Doha, Qatar*

Introduction: Lipedema is an uncommon disfiguring disorder frequently misdiagnosed as diet-induced obesity and/or lymphedema, almost exclusively affecting women, but a few cases have been reported in men. Given the lack of knowledge and little evidence about this disorder world widely. In Qatar, it is mostly unrecognized due to decreased awareness among most of healthcare providers along with the Cultural taboo delaying patients from reaching them. This leads to late referrals leaving patients in psychosocial distress including anxiety, depression, isolation and eating disorders. Having a dedicated Lymphedema clinic only recently opened, healthcare providers are not still fully aware of the availability of this service in Qatar which makes patients feel rejected especially when they are branded as being simply “Obese”.

Aim: To identify Lipedema cases & its incidence in the state of Qatar from 2016 to 2018.

Method: As the only dedicated Lymphedema clinic in Qatar, we have been conducting awareness programs, lectures & workshops for healthcare providers in National & International conferences. In 2016 we joined the Vascular Multidisciplinary Team, which led to receiving patients with different lymphatic & vascular disorders by which we were able to identify Lipedema cases by clinical examination & assessment. Dedicated therapists were assigned for data collection of these cases. From 2016-2018 given the increased number of patients & based on the data collected, we were able to assess the variables (Age, Gender ,Body mass index and other factors) affecting the incidence of this disorder in the patient population in the state of Qatar.

Results: From 2016 to 2018, 38 patients (N=38) were identified as Lipedema cases, with mean age of (50.13) ranging between (32-74), Majority of patients were Qatari (81.5%), with Male to female ratio of (1:37) , mean BMI was (45.24) ranging between (25.64-73.46), nearly (10) patients presented with family history, (20) had history of previous surgeries with pain and cellulitis history presented in (21) & (10) of those patients respectively.

Conclusions: Lipedema is a rare entity of fatty deposition; the lack of research and understanding about this disorder has contributed to its common misdiagnosis. Early diagnosis & recognition of the clinical features will allow for more effective & efficient management. Further studies are required to identify the real prevalence of Lipedema given the diverse population in state of Qatar.

[P31] A FACULTY SURVEY ON THE STATUS OF LYMPHOLOGY EDUCATION IN ENTRY-LEVEL DOCTORATE PHYSICAL THERAPY PROGRAMS

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Introduction: Lymphedematous conditions are encountered in physical therapy practice settings. Entry-level doctorate physical therapy (ELDPT) students require education in lymphology. Lymphology education in ELDPT programs has not been examined for 20 years; therefore, creating an opportunity to explore if knowledge gaps exist in basic science, examination, and interventions.

Aim: 1) describe the coverage of lymphology content within ELDPT programs; 2) identify whether lymphology content is perceived as entry-level material; 3) determine the relationship between perceived grade (PG) of the lymphology curriculum and hours devoted to lymphology content.

Method: A cross-sectional research design was implemented, using an online survey, delivered to program directors of 221 ELDPT programs in the US, who were requested to disseminate the survey to departmental faculty.

Results: Forty-three surveys were analyzed, representing thirty-five universities. Types of edema taught – mechanical insufficiency (86.8%, n = 33), dynamic insufficiency (73.7%, n = 28), combined insufficiency (68.4%, n = 26), and lympho-lipedema (57.9%, n = 22). Lymphedema interventions were taught in integumentary (47.4%, n = 18), and cardiopulmonary (31.6%, n = 12) courses, and rarely in neuromuscular (2.6%, n = 1), and musculoskeletal (7.9%, n = 3). Variability existed across curriculums in range of hours devoted to didactic (0.4-14.1 hours) and laboratory (0.0-10.0 hours) instruction.

Respondents somewhat to strongly agreed that lymphatic system anatomy and physiology (88.4%, n = 38), pathophysiology (90.7%, n = 39), and examination (81.4%, n = 35) were ELDPT material. 58.1% (n = 25) of the respondents somewhat to strongly agreed that manual lymphatic techniques were entry-level, while 23.2% (n = 10) somewhat to strongly disagreed. 58.1% (n = 25) of the respondents somewhat to strongly agreed that education on multi-layer compression bandaging was entry-level, while 20.9% (n = 8) somewhat to strongly disagreed.

The PG of content adequacy of lymphology curriculum programs averaged a “C” (M = 3.47, SD = 0.70, N = 43). Spearman rank correlations indicated a positive relationship between number of lecture hours and PG for anatomy and physiology [rs (33) = 0.36, p = 0.04], pathophysiology [rs (34) = 0.47, p = 0.005], examination [rs (29) = 0.42, p = .02], compression devices [rs (31) = 0.50, p = 0.004], and manual lymph drainage [rs (31) = 0.36, p = 0.044].

Conclusions: Consistent lymphology content and format is lacking for examination skills, and interventions within the ELDPT programs. This study supports developing unified content standards of professional entry-level lymphology curriculums.

[P32] THE PREVALENCE OF LYMPHEDEMA RELATED SYMPTOMS IN WOMEN TREATED WITH RADIOTHERAPY FOR GYNECOLOGICAL CANCER IN SOUTH AFRICA

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Introduction: Despite the fact that women who receive radiotherapy for gynecological cancer have a lifetime risk of developing lower limb lymphedema, these women are not routinely screened for this complication of cancer and its treatment. Accepting lymphedema as an insignificant complication and the lack of resources lead to this dire situation. Identifying the most prevalent symptoms experienced by women with lymphedema could assist nurses practicing in resource-restricted communities to prioritize limb circumference measurements for women reporting these symptoms and initiate timely treatment.

Aim: To compare the prevalence of lower limb symptoms reported by women who developed lymphedema after radiotherapy for gynecological cancer with those who did not develop lymphedema in the given period.

Method: We used a cross sectional design and screened a calculated, convenience sample of 155 women (n=155) having completed treatment between 12 and 24 months prior to collecting the data. Structured interviews were conducted and the GCLQ (short form) served as data collection instrument. Limb circumference measurements, defined by an inter limb volume difference of 200ml, were done to identify lymphedema. The data were entered onto an Excel spreadsheet and STATA version 14 was used for analysis. Chi square, significant at $p \leq .05$, was used to calculate the relationship between the variables.

Results: The majority of the women (60%; n=93) were between the ages 40 and 60, had cervical cancer (87.7%; n=136) and 29.7% (n=46) had lymphedema. Aching was the most prevalent symptom experienced by both groups; 51.4% (n=56) in women without lymphedema and 47.8% (n=22) in those with lymphedema. Hip swelling was the least prevalent; 6.4% (n=7) in those without lymphedema and 6.5% (n=3) in women with lymphedema. Higher percentages of women without lymphedema (n=109) experienced tenderness, swelling, increased leg temperature, numbness, stiffness, aching and groin swelling compared to those who had lymphedema. A greater percentage of those with lymphedema (n=46) reported swelling with pitting, firmness, heaviness and hip swelling than those without lymphedema. However, Chi square found no relationship between the variables.

Conclusions: Despite limited resources, all women treated with radiotherapy for gynecological cancer should be assessed for lower limb lymphedema by means of a validated questionnaire and circumference measurements, as symptoms alone is not a successful indicator of the possible presence of lymphedema.

[P33] STREPTOCOCCAL SEX SYNDROME- AN UNUSUAL COMPLICATION OF LYMPHOEDEMA

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Patient Presentation: A 44 year old female presented with a history of 6 episodes of acute left groin cellulitis over a 2 year period requiring hospital admission and intravenous antibiotics. All episodes of cellulitis occurred after the patient had sexual intercourse. The patient became systemically unwell on each occasion developing erythema and warmth in her pubic area and left upper thigh/groin.

The patient was diagnosed with cervical cancer in 2011 and with recurrence in 2012. She was treated with a radical hysterectomy followed by radiotherapy and chemotherapy. The patient developed left upper thigh lymphoedema almost immediately and manages this condition with regular manual lymphatic drainage and compression garments.

The patient is both physically and emotionally affected by her lymphoedema and recurrent cellulitis and presented to clinic for advice. She has avoided sexual intercourse for the past 5 months and this is now putting a strain on her relationship with her partner.

Physical Examination: On examination there was modest left leg swelling – left thigh measures 56cm compared to right thigh 54cm. Pedal pulses were palpable and Stemmers sign was negative. Her skin was dry and the left thigh was soft to palpate but there was induration in the groin and pubic area.

Summary: 44 year old lady with groin and pubic lymphoedema secondary to cervical cancer who presents with a 2 year history of recurrent groin cellulitis following sexual intercourse.

Discussion: Two similar cases were reported in 1987 and the entity was named Streptococcal Sex Syndrome (SSS)¹. It was postulated that the vagina is the site of inoculation following microtrauma from intercourse. Management includes moderation of sexual stimulation, use of a water-soluble lubricant jelly and prophylactic antibiotics. Only one other case has been reported in 2018².

This is an often forgotten and rare complication of pelvic cancers which has a significant impact both physically and emotionally on patients. Simple measures can result in complete control.

Ref.:

1. Ellison 111, R., McGregor, J. Recurrent postcoital lower-extremity streptococcal erythroderma in woman. Streptococcal sex syndrome. JAMA 1987;257:3260-3262.

2. Santos, M B., Soares, R F., Basto, F. Streptococcal sex syndrome: a curious association between sex and cellulitis. Gynecologic Oncology Reports 2018;26: 11-13.

[P35] A CASE STUDY OF THE TREATMENT OF AN INDIVIDUAL WITH COMPLEX ABDOMINAL LYMPHEDEMA

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Introduction: The definition of lymphedema as prolonged abnormal swelling pales to its associated affects of physical, human and financial costs. A person's lymphedema sequel worsens partly due to lack of awareness by health care providers and resources to adequately treat. The condition's deterioration takes on further urgency as research links lymphedema, obesity and inflammatory processes. The circumstances described above are personified in the case of a 55-year-old female (Ms. DN) who has a 14-year history of abdominal lymphedema. She has a BMI of 62 and a history of diabetes, and hypothyroidism. Ms. DN had > 4x/year incidence of cellulitis and systemic infection, two abdominal wounds, increase use of health care system and increasing dependence on IADLS and ADLS. The use of coban 2 two layer compression system lent itself well to Ms. DN's unique situation of an upper and lower pannus and two significant exuding wounds.

Aim: Monitor the effects of edema reduction using coban 2 compression system as part of the lymphedema treatment regimen.

Method: A five-month treatment protocol was initiated. Intervention included increasing personal supports (ADLs/IADLs) added protein supplements to diet, increase wound monitoring and use of advanced wound dressing and **Introduction** of compression therapy. Compression was applied by an occupational therapist with advanced training in complete decongestive therapy 3x/week following nursing wound care visit. Compression was initiated using coban 2 lite and by the third week progressed to coban 2 regular (12cm and 16cm width). Foams were used in conjunction with the coban 2 to ensure uniform shape and compression of both the upper and lower pannus. Three circumferential measurements at 10cm increments were taken bi monthly at a specialty wound clinic with the supervising nurse

Results: There was a 40cm decrease of total circumferential within the first month of initiating coban 2. This gain was maintained in the four subsequent months. Visual changes to the skin included decrease/ reduced presence of papillomatosis and keratosis, decreased wound size, reduced wound exudate from copious to scant and reduced wound dressing associated pain. Ms. DN reported returning to driving by the start of the second month of initiating treatment.

Conclusions: The use of five-month compression positively affected Ms. DN abdominal lymphedema beyond the obvious size reduction. The coban 2 system lent itself well to the softening of fibrotic tissue, irregular shape of the two pannus as well as accommodating advance wound dressing.

[P36] CASE REPORT TO DEMONSTRATE THE NEED FOR SELECTION CRITERIA FOR OPTIMAL ADJUSTABLE VELCRO WRAP PRESCRIPTION

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Introduction: Compression, in the form of either a compression bandage or a compression stocking, has been touted as the gold standard for treatment of swelling and venous leg ulcers (VLU). (ILF 2012, O Donnell et al 2014, Stout et al 2012, Partsch et al 2008) Adjustable Velcro wraps have been marketed as compression alternative(Williams A 2016). Although there is a growing body of evidence to support use of these products, there has not been a critical evaluation of the functionality of the devices to best matching product to patient presentation and ability to utilize the device effectively. Unlike compression garments, which are classified by compression category (class I/II or flat knit /circular), there is not an algorithm to direct health care providers to best match a specific adjustable Velcro wrap to an individual patient presentation.

Aim: This case series sought to demonstrate that although each product demonstrated ability to produce the marketed level of compression, realistic utilization of the product varies based on patient limb characteristics and functional level.

Method: Three different adjustable Velcro wraps were reviewed. Each product was applied per the manufacturer's instructions. Resting pressures for each device were measured using a validated tool on a normal volunteer. Five patients who had previously been wrapped were issued the products and instructed with application/use. Evaluation of performance of each device were documented by the patient and the clinical staff to include ease of application, volume containment, and any undesirable characteristics.

Results: Marketed compression profile was demonstrated in each device. However, there were significant differences in the patients' ability to effectively apply the product and for the product to adequately maintain compression for the limb.

Conclusions: This small case series demonstrates that although each product performed as marketed in vitro, performance in clinical setting varied greatly dependent on patient presentation and functional skill level.

[P37] FEASIBILITY OF MOBIDERM® USE A SELF-BANDAGE BY SECONDARY LOWER LYMPHEDEMA PATIENTS; A CASE STUDY.

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Introduction: Improvement in skin and edema conditions of lymphedema patients to prevent cellulitis is important. MOBIDERM® is a system used for the mobilization of edematous or indurated subcutaneous tissues.

Aim: This case study aimed to clarify the feasibility of MOBIDERM® use as a self-bandage by lower lymphedema patients at their homes.

Method: We used MOBIDERM® instead of standard bandages as self-care for 2 months. A certified lymphedema therapist nurse educated each patient about the use of MOBIDERM® before each patient used it at home. Once a month, a nurse verified this situation. Outcome was the change in the thigh, lower leg, and ankle circumferences by measurement. Skin and edema conditions were evaluated using an original questionnaire and visual analog scale (VAS), respectively. Ethical approval was obtained from the Kanazawa Cardiovascular Hospital and Kanazawa University.

Results: We recruited two patients with late Stage II secondary lymphedema. Self-care was performed using MOBIDERM® at the patient's home. Case 1 was an 83-year-old with an affected right limb. The circumference reduced by 1.0 cm (from 53.0 to 52.0 cm) in the thigh and other sites were stable. Case 2 was a 77-year-old with an affected left limb. The circumference reduced by 0.7 cm (from 52.4 to 51.7 cm) in the thigh and increased by 2.1 cm each in the lower leg and ankle (from 42.1 to 44.2 cm and 23.8 to 25.8 cm respectively). Both patients had no skin trouble, and edema condition did not worsen. Heaviness, tightening, and hardness improved (Case 1; 8.5→7.4 cm, 8.5→7.4 cm, 8.5→0.4 cm, respectively; Case 2; 4.9→2.2 cm, 8.1→2.2 cm, 4.9→1.0 cm, respectively); strangely, this was increased in Case 2 (0.1→1.0 cm).

Conclusions: We clarified the feasibility of MOBIDERM® use for self-care by secondary lower lymphedema patients who could continue using daily self-bandage. Edema heaviness, tightening, and hardness improved following MOBIDERM® use. The reported success might be due to the massaging function of the small cushions in this reduction in the circumference with this bandage as self-care should be consider.

[P38] A NEW COMPRESSION GARMENT FOR PATIENTS WITH PRIMARY LYMPHOEDEMA?

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Introduction: Lymphoedema is associated with dysfunctional lymphatics, tissue fibrosis and inflammatory changes in the skin and local tissue. Oxygen is an essential substrate required to supply the amount of energy required for tissue renewal. Providing patients with safe compression which also enhances their tissue health is paramount when supporting their self-management regimens. A range of compression devices should be available to meet individual needs as they progress through the day without compromising their lymphoedema and tissue health as their activities change in a 24-hour management plan. Ensuring compression supports tissue health is crucial to the management of lymphoedema.

Aim: This case study aims to explore the use of a new compression garment in two sitting positions in an adult with primary lymphoedema.

Method: An eighteen-year-old female (BMI: 25.2kg/m²) with Milroy's Disease, was recruited. All data conformed to the Declaration of Helsinki and ethical principles. She attended two separate one-hour sessions to evaluate StO₂ in chair-sitting and long-sitting positions. Following removal of her usual Class 2 (20-30mmHg) flat-knit compression hosiery, StO₂ was recorded for 20-minutes Pre, during and post a 20-minute application of the TributeWrap™ (Lohmann-Rauscher, DE) to the right leg.

Results: In the long-sitting position, StO₂ levels started high at baseline (94.5%) remaining relatively maintained both during and post a short 20-minute intervention (94.1%). In the chair sitting position, StO₂ levels were significantly lower at baseline (52%), showing a 77% increase during the intervention (92%) followed by a small 9% decrease post-intervention (83.7%). The patient described comfort levels highly positively in both positions, with further comparisons made to reduction in swelling seen after bandaging also comparing the effects to hosiery, with more movement possible post-intervention. Compliance was described as extremely likely due to the comfort and ease of application.

Conclusions: This compression garment significantly increased StO₂ levels in the chair sitting position whilst maintaining the effects of the patients' compression stockings, in the long sitting position. Baseline oxygenation levels (52%) were similar to levels seen in an earlier healthy leg study (56%), indicating that the patients' normal prescription hosiery maintains StO₂ similar to non-lymphoedematous limbs. When increasing tissue oxygenation through short intervention sessions, this washable compression garment has the potential to improve tissue health in individuals with Primary Lymphoedema. This not only encourages self-management, but also offers a potential night time compression solution where the need arises in a 24-hour management plan.

[P39] CAN A NEW COMPRESSION GARMENT IMPROVE TISSUE HEALTH?

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Introduction: Compression systems such as bandaging, compression stockings and self-adjustable wrap systems aim to correct venous insufficiency by counteracting the force of gravity, increasing cutaneous pressure. Compression therapy has been shown to increase the efficacy and effectiveness of both the lymphatic and venous system in moving fluid. Compression garments have been shown to reduce venous stasis and increase blood, lymphatic flow and skin tissue oxygenation (StO₂), promoting healthy tissue. Though compression garments are primarily associated with Lymphoedema, there is also an increasing use in sports performance, to aid faster recovery and reduce fatigue.

Aim: This quantitative study aims to explore the efficacy of a new compression garment in three sitting positions in healthy adults by monitoring skin tissue oxygen levels.

Method: Twenty-eight participants (aged 24.6 years±8.4years; 13 Males, 15 Females) were screened and recruited using (PAR-Q, CA). All data conformed to the Declaration of Helsinki and ethical principles. Participants attended three separate one-hour sessions to evaluate StO₂ in supine-lying, chair-sitting and long-sitting positions. StO₂ was recorded for 20-minutes Pre, during and post a 20-minute application of the TributeWrap™ (Lohmann-Rauscher, DE). A repeated-measures analysis of variance (ANOVA) was followed by post-hoc pairwise comparisons.

Results: A significant difference was seen between the three seating positions (p=0.000; figure 1). Chair-sitting had the lowest StO₂ pre-intervention and no significant difference was seen between long-sitting and supine-lying (p=1.000). When chair-sitting, the garment increased StO₂ significantly during the intervention (32.25%, p=0.000) and decreased StO₂ significantly following the intervention (5.6%; p=0.000) yielding an overall 24.8% increase from baseline to post intervention. In contrast long-sitting and supine-lying only increased post-intervention (11%/16.8% respectively, p=0.000); compared to baseline.

Figure 1

Conclusions: This compression garment significantly increased StO₂ levels in all seating positions. Increasing StO₂ through short intervention sessions with this portable device has the potential to improve tissue health in individuals with reduced mobility, oedema or venous insufficiency. Further use of the product is also possible in post-game recovery in sport. This reusable compression device has the potential to encourage self-management of tissue health in multiple settings, therefore warrants further research with specific groups.

[P40] LOWER EXTREMITIES WITH OEDEMA AND DAYTIME ACTIVITIES AMONG ELDERLY INDIVIDUALS IN A NURSING HOME: PRELIMINARY STUDY

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Introduction: In elderly care facilities, elderly individuals spend most of the daytime in a sitting position as a deterrence against becoming bedridden. However, opportunities to move the lower limbs are decreased by continuous sitting, and the feet may become easily swollen. Our previous prospective study showed that severity of oedema in Japanese elderly individuals increased over time and progressed to non-pitting oedema in the lower extremities.

Aim: To investigate the severity of oedema in the feet and daytime activities among elderly Japanese individuals in a nursing home.

Method: In this observational cross-sectional study, participants were nursing home residents ≥65 years old in August and September, 2018. Elderly individuals whose family members did not consent to participation were excluded. Collected data included age, sex, diagnosed diseases, Mini-Nutritional Assessment (MNA), immobility, and oedema in the feet. Severity of oedema was assessed at 4 sites per foot: the pretibial edge, medial malleolus, lateral malleolus, and dorsum of the foot. The severity of oedema was evaluated using the modified Fukazawa method (grade 0-4), with grade ≥2 define as “with oedema”. The sum of the severity scores each 4 sites at right and left foot was used as the oedema score. The researchers observed participants’ movement (frequency of standing up, walking, and daily activities) during the daytime for 2 days (total 19 hours). This study was approved by the Medical Ethics Committee at Fukui Prefectural University and the participating nursing home.

Results: Participants were 9 women (median age, 91 years; IQR, 80-97 years). All participants ranked at levels II or III on the activities of daily living scale for people with dementia. Five individuals were chair-bound, three used a cane or walker, and one was bed-bound. According to MNA classifications, 8 individuals were considered at-risk of malnutrition, and one individual was malnourished. All participants showed “with oedema” at assessment point. The median oedema score was 9 (IQR, 6-15). The median time spent sitting was 12.5 hours (IQR, 12.1-14.5) per over the full 19 hours. The participants spent 65.8% (IQR, 64.0-78.1) of daytime hours in a sitting position.

Conclusions: The participants were found to spend most of the day in a sitting position. This is a big problem in Japan due to its high elderly population. It is necessary to increase the opportunities for elderly people to move their lower limbs.

[P41] LIPEDEMA AND DIETS, DOES IT WORK?

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Introduction: Lipedema and diets

In 2018 Ellen Kuijper-Kuip was awarded an oral presentation called: Review lipedema guidelines.

For this presentation the UK, German and Dutch guidelines were reviewed, but also 594 patients were interviewed to give them a voice too. One of the treatments mentioned in all guidelines are dietary measures. But (at least in the Netherlands) dietitians were not part of professionals setting up the guidelines.

Aim: 409 out of 594 patients mentioned daily weight problems and 119 of them have regularly weight problems! Only 55 out of 594 patients told that they benefitted a lot from dietary measures. And 120 had reasonable benefits from a diet. Some patients mentioned eating disorders and all kind of different diets are mentioned, taken by patients.

During the study dietitian in the Netherlands, lipedema is not a subject and therefore lipedema seems to be an unknown health problem amongst dietitians. So it is very questionable if dietitians can be very helpful in the treatment of lipedema patients at all.

Method: Authors are performing a review study about lipedema and diets and are interviewing dietitians and patients to get more clarity about lipedema and diets.

Questions of this study are;

- In which way can dietitians contribute in the treatment of patients with lipedema
- What are current dietetic treatment methods and do they work
- How well known is lipedema amongst dietitians and which kind of diets are recommended.
- What kind of diets problems experience lipedema patients themselves

Results: This study will be completed and ready for presentation before June 2019!

Conclusions: Authors do not only hope to get more clarity about lipedema and diets but also hope that dietitians get more aware of the disease lipedema and that patients will get better and more scientific proven advises about dietary treatment possibilities.

Ellen Kuijper-Kuip

Mirte de Vries

[P42] IMPLEMENTATION OF PATIENTS CARE ACTIVITIES PARALLEL WITH MASS DRUGS ADMINISTRATION (MDA) IN TANZANIA ENDEMIC AREAS

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Introduction: Tanzania began its Elimination Programme for Lymphatic filariasis disease in a year 2000 with the formation of Tanzania National Lymphatic Filariasis Elimination Programme (NLFEF), Mafia District in Pwani region being the first to implement Mass Drugs Administration (MDA) with Albendazole and Ivermectin. Post MDA feedback indicated reduction or stopping of acute dermatolymphangioadenitis (ADLA), reduction of leg circumference to some individuals and improvement of skin for affected part with lymphoedema. In 2001, under the TNLFEP, a lymphatic Filariasis (LF) clinical reference center was established with an aim to provide treatment and instruction on self-care to the many previously unattended lymphoedema (LE) and hydrocele patients.

Aim: Aim of the study is to document and monitor LF clinical cases and determine the impact of patient care in parallel with MDA.

Method: During clinical visits, the attendee is clerked, physical examination is done and a diagnosis is made. Counselling is provided in parallel with health education skin care management, wounds care and lymphoedema hygiene training. During the visit provision of anti-filarial medicines and at times lymphoedema management kits are freely given to enhance lymphoedema management practice while at home. Hydrocoele patients are counselled for surgical intervention.

Results: Over 1200 patient visits have now been reported at the clinic having improvements. These improvements ranged from skin quality, reduction on limb size, increased ability to perform daily activities, minimization of stigmatization and hence a dramatic improvement in the quality of life of patients.

Conclusions: Findings strongly suggest that the implementation of patient care activities parallel with MDA programmes for LF are extremely beneficial and should be encouraged.

[P43] SIGNIFICANT IMPROVEMENT IN QUALITY OF LIFE AFTER TREATMENT OF LOWER EXTREMITY LYMPHEDEMA WITH NEGATIVE PRESSURE APPLICATION

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Introduction: A 55 y.o. woman presents with a 17-year history of Stage III secondary lymphedema in her right lower extremity after cervical adenocarcinoma requiring pelvic and inguinal lymph node dissection. Despite reported aggressive self-management efforts involving daily pneumatic compression use, wearing day and night compression garments and receiving professional manual lymphatic drainage (MLD) twice a month from a certified lymphedema therapist (CLT), she experiences daily pain and states that episodes of intensive outpatient complete decongestive therapy (CDT) result in minimal response to pain and quality of life changes. With a new treatment option available, the patient underwent a course of CDT in conjunction with the use of a manual negative pressure device, PhysioTouch®.

Aim: To assess if CDT combined with PhysioTouch® has a patient-valued impact on her expressed pain and quality of life.

Method: The patient was treated weekly for 10 visits with MLD in combination with PhysioTouch® for 60 minutes duration. She continued her usual daily self-management though temporarily stopped her daily use of compression pump and regular professional MLD sessions. Pain ratings were made using the Visual Analogue Scale (VAS) and volumetric measurements were obtained using perometry. Additionally, clinical assessment of skin and superficial tissue mobility was acquired through palpation and quality of life data was attained using the Patient Specific Functional Scale (PSFS) and Lower Extremity Functional Scale (LEFS).

Results: VAS improved from 4/10 to 1/10. Tissue palpation revealed a change of improved tissue movement and reduced thickness post treatment. Leg volume revealed essentially no change (initial: involved=12438ml, contralateral=7556ml, % difference=69.1%; post: involved= 12446ml, contralateral=7305ml, % difference=70.4%). PSFS improved from 2 to 6 where the minimal detectable change (MDC) is 2 points, and LEFS improved from 53 to 67 (MDC=10).

Conclusions: Results suggest incorporating negative pressure in a patient's plan of care should be considered.

[P44] SECONDARY LEG LYMPHEDEMA DEVELOPMENT AND DELAYED WOUND HEALING AFTER CORONARY ARTERY BYPASS GRAPH SURGERY VEIN HARVESTING IN AN AT RISK LIMB: CDT MANAGEMENT WITH WOUND HEALING IN 2 WEEKS

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Introduction: At the present time, there are a limited number of studies on patients at risk for lymphedema who also undergo coronary artery bypass grafting (CABG) with femoral vein harvesting. A patient who had ovarian cancer 3 years earlier (in 2012) had no reported swelling and underwent CABG treatment in 2015. Post surgery, the patient presented with swelling, repeated cellulitis infections, and delayed wound healing in the leg where the femoral vein was harvested.

Aim: To demonstrate that complex bandaging for lymphedema can reduce the length of time for complex wounds to heal following CABG surgery in a patient with past ovarian cancer.

Method: A standard case history obtained from the patient revealed no outstanding risks or complications. During multiple phases of treatment, pictures were taken of the affected leg and leg wounds. In addition, a standard treatment plan of Combined Decongestive Therapy (CDT) was implemented, including: skin care, wound care, manual lymph drainage, exercise and bandaging. CDT treatments were completed three times a week for 3 months.

Results: Within one month, the three open wounds closed completely. The lymphedema was stabilized and the client has returned to prior level of function and activities of daily living (ADL) with compression stockings.

Conclusions: Patients planning to undergo CABG surgery should be aware of the risks and potential onset of lymphedema related swelling, especially for those patients at risk from prior cancer treatments. As well, these types of surgeries are also associated with cellulitis as well as delayed wound healing. A key treatment strategy to address lymphedema in these patients is Combined Decongestive Therapy, which can aid in wound healing and lymphedema volume reduction

[P45] SCLEROSIS OF PAPILLOMATOSIS

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Introduction: Papillomatosis have major consequences on the quality of life of our patients, particularly because of episodes of lymphorrhea and the associated risk of infection, but also aesthetic and psychological especially as they are located in the genital sphere.

Aim: The management of these patients is complex and requires a multidisciplinary management associating physiotherapist, nurse, doctor, gynecologist, urologist and plastic surgeon. Lymphedema should be maintained by a compression adapted to the localization of edema during the day, an inelastic compression associated with fragmented mobilizing foam at night, global lymphatic drainage should be performed regularly and the patient should be trained to self-managment especially for the genitals lymphedema. The assessment of the severity of papillomatous is done on the presence or absence of lymphorrhea, the number of infectious episodes presented by the patient, the comparison of images before / after treatment, by accounting for the number of lesions and trying to assess their size, as well as assessing the discomfort felt by the patient (scale from 1 to 10). The papillomatosis on the affected limbs or toes respond well to the medical treatment well conducted with the realization of regular bandages, drainage and optimal compression. It may be necessary to perform a limited complementary resection in case of significant discomfort (for example, for the footwear), but it must be performed by a trained surgeon working in a reference lymphedema's center.

Method: Genital lymphedema involvement is characterized by the presence of pedicle papillomatosis, which may be like a bunch of grapes, a cavities, often associated with more or less abundant lymphorrhea. Surgical resection can be performed which must be limited but recurrences are frequent. These lesions can be sclerotic in consultation by injection of Aetoxisclerol 0.5% foam after application of lidoïcaine cream for 1h. It could be injected from 2 to 10cc maximum per session. This treatment was performed, one time or several times, on 8 patients followed at Montpellier University Hospital.

Results: The first results have led to a decrease (1), a temporary (1) or permanent cessation (2) of discharge, a decrease in number of infectious episodes (2) and a decrease in size and number of papillomatosis lesions for some (n=6).

Conclusions: This series of patients is short but shows the interest of being able to offer complementary therapeutic possibilities in the complex management of our patients. A study on a larger population with a longer follow-up, especially for recurrences, will be necessary to complete our first observations.

[P46] REDUCTION KIT VERSUS SHORT STRETCH BANDAGING OUTCOMES IN THE REDUCTION PHASE OF COMPLETE DECONGESTIVE THERAPY: CASE REPORT

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Introduction: Complete Decongestive Therapy (CDT) has been recognized as a successful treatment intervention for symptoms consistent with lymphedema¹. The current treatment standard of reducing lymphedema is with application of short stretch compression bandages². These bandages are often reported by patients as bulky, hot, cumbersome, and difficult to don/doff. There is a more recent product, known as a Circaid Reduction Kit, which can be used as an alternative to compression bandaging. Unfortunately, the Circaid Reduction Kit is an expensive out of pocket cost and further research needs to be completed to determine its effectiveness.

Aim: This case study compares the Circaid Reduction Kit to the compression bandaging on a single patient with stage 1 bilateral lower extremity lymphedema and includes both objective effectiveness and the patient's subjective satisfaction with both applications.

Method: A 57 year old female with stage 1 phlebolympheidema was provided with short stretch bandages for her right leg and foot and a Circaid Reduction Kit and PAC band for the left leg and foot. Girth measurements were taken by the same physical therapist at the onset of every visit over a five week time frame. Pictures were documented of both legs at the onset of each appointment. Outcomes included patient satisfaction outcome provided by Medi as well as Lymphedema Quality of Life Questionnaire.

Results: According to this case study, when comparing the use of Circaid Reduction Kit and short stretch compression bandaging on the calf and foot, volume reduction percentage is similar. Patient rated much greater satisfaction using the Reduction Kit over the bandaging and her skin seemed to tolerate the Reduction Kit better.

Conclusions: From a clinician standpoint, it is much easier to educate and teach application of the Reduction Kit over the short stretch compression bandaging and is also easier to don and doff. This study suggests that the Reduction Kit is not only as effective as short stretch bandaging at reducing volume, but the Reduction Kit also demonstrates greater patient satisfaction based on fit, ease of use, application time and ease of initial application.

National Lymphedema Network (2017). Stage 1 Lymphedema. Retrieved from <https://www.lymphnet.org/overview/what-is-lymphedema/signs-and-symptoms/stage-1>

2 NLN Medical Advisory Committee (February 2011). The Diagnosis and Treatment of Lymphedema [PDF file] retrieved from <https://www.lymphnet.org/pdfDocs/nlnTreatment.pdf>

[P47] LIMITED USABILITY OF LYMPHOSCINTIGRAPHY IN FOLLOW-UP OF PRIMARY LYMPHEDEMA

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Introduction: The diagnosis of primary lymphoedema and the initiation of appropriate treatment is usually significantly delayed. In spite of continuous progress in diagnostic and therapeutic methods, we do not observe any improvement in frequency of taking primary lymphoedema into account in diagnostics. To identify the cause of edema, various imaging methods can be used. The lymphoscintigraphy it is a non-invasive method, easily repeatable, inexpensive, having no negative effect on the vessel endothelium. Considering all the advantages of LS, the few contraindications to it, and perfect suitability of this method for imaging of edemas, it is surprising that it is not taken into account in routine diagnostics to recognition of primary lymphoedema.

Aim: We emphasize the role of LS as a gold standard in diagnosing primary lymphoedema and its limited usefulness for supplementary assessment in monitoring treatment outcomes.

Method: Clinical case. Patient 49 years old after a long journey, she noticed swelling in the area of the right ankle. The size of the edema was initially different, but later it gradually increased. It was only 8 years since the beginning of the disease, after another visit to the surgeon, LS was performed. Disturbances in the formation of lymphatic vessels and lymph nodes of the right leg were detected. After diagnosis, she was treated intensively physiotherapeutically with clinical and metric improvement. For objective observation, LS (2013) was repeated, but no differences were detected compared to LS (2006). However, the functional and clinical improvement after physiotherapy was high. The biggest differences between measurements before and after intensive physiotherapy at the groin, thigh, ankle and foot level are significant ($p < 0.05$).

Results: LS allow an objective assessment of lymphatic edema in patients undergoing intensive physiotherapy. In our patient, LS was performed at the beginning and during therapy, but gave almost identical results. Despite the lack of scintigraphic improvement during intensive therapy, the metric measurements of the affected limb were significantly reduced, subjectively felt much better, the limb mobility / functioning was significantly improved, and the swollen tissues were much softer.

Conclusions: It seems that it is particularly important to extend the diagnostic methods. The probable reason for the contrast between scintigraphy and clinical improvement is not entirely clear and should be the subject of further research and it seems that the lack of regression of lymphoscintigraphic disease should not be the only indication for detention or modify physical therapy in such advanced cases.

[P48] ARE COMPRESSION CORSETS BENEFICIAL FOR THE TREATMENT OF BREAST CANCER RELATED LYMPHEDEMA? NEW OPPORTUNITIES IN PHYSIOTHERAPY TREATMENT.

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Introduction: There is no fully effective treatment for secondary lymphedema. In patients with breast cancer, lymphedema may present immediately after axillary dissection or years later. It typically occurs in a limb (such as an arm), but it can also occur in the torso, especially in breast cancer patients. It is, therefore, essential to prevent or minimize the condition. The currently used compression therapy has varying efficiency. Thus, researchers are still looking for better solutions, especially for primary prevention.

Aim: whether compression corsets therapy with a class I compression garment could prevent truncal lymphedema on the operated side in females who underwent mastectomy and axillary lymph node dissection as the standard of care for breast cancer treatment and whether this therapy is efficient in prevention and treatment of truncal lymphedema in patients who underwent mastectomy and additional radiotherapy, and whether this method could be implemented for pain reduction strategies in this treatment group.

Method: The study was carried out in 50 randomly selected breast cancer patients classified by the oncologist as candidates for surgery. The final study was completed in 37 patients who underwent mastectomy and lymphadenectomy. The group was randomly divided into two subgroups: received compression corsets 1 month following the surgery and control- in which the patients underwent no physiotherapeutic treatment. The size of truncal lymphedema was measured using ultrasound in presentation B. Measurements were carried out symmetrically on both sides of the chest wall. The patients were examined four times. The follow-up was for 7 months in total. After the second measurement, a randomly selected subgroup of patients received fitted compression corsets, which they had to wear throughout the study, the control subgroup had no physiotherapy treatment. The results were statistically analyzed. In both subgroups, we analyzed the reduction of pain using a VAS.

Results: The results strongly suggest that when properly fitted, class I compression corsets not only are an effective treatment for lymphedema but also could be used for antiedematous prevention in patients who underwent removal of axillary lymph nodes as well as radiotherapy. Results of these studies have also confirmed that the use of compression corsets could reduce pain associated with surgical treatment of breast cancer.

Conclusions: Class I compression corsets should constitute an integral element of complete decongestive therapy. There is an urgent need for developing generally accepted rehabilitation protocols for breast cancer patients, including broad, modern, and comprehensive approach to the physiotherapeutic treatment.

Notes

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